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PART I.

Original Contributions.

A CANCEROUS TUMOUR ORIGINATING IN AN EYE WHICH
HAD BEEN LONG LOST FROM SOME INFLAMMATORY
AFFECTION.

By GEORGE LAWSON,

*Surgeon to the Royal London Ophthalmic Hospital, and to the
Middlesex Hospital.*

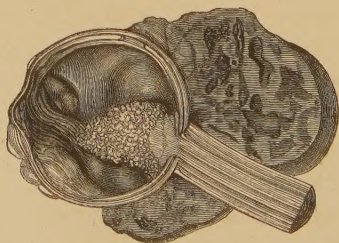
Mr. William F., æt. 69, always a healthy man and with no family history of cancer, last came under my care in January of this year for the purpose of having a long-lost, and apparently disorganised eye removed.

The sight of the left eye was first greatly impaired from a blow he received many years ago from a twig of a tree whilst out shooting, and since this accident he has been only able to see objects imperfectly. In 1860 he suffered severely from an inflammatory attack in the same eye, which appears to have caused a leucoma of the cornea, and to have completely destroyed all the remaining sight. For the first five or six years the lost eye gave him no annoyance, but after that time it became subject to recurrences of inflammation, some of which were very severe and

painful. He was repeatedly urged to have the lost eye excised, on the plea that not only would his sufferings be relieved, but the risk which he incurred of the sound eye becoming sympathetically affected would be also removed. He would not, however, consent to an operation. In October, 1870, the sound eye was destroyed by a single shot penetrating it whilst out rabbit shooting. The poor man was now quite blind, and pain was the only argument which would be likely to make him part with the eye which was undergoing disorganising changes. Since the last accident I have from time to time seen the patient, and have also frequently urged upon him the necessity of having the painful eye removed, as it was still liable to recurrences of inflammation, whilst the eye that was shot gave him no pain.

For four or five months before he came to me in January of this year, the eye had begun to bulge, and the pain which was at one time occasional was now almost constant, and at night the exacerbations were often very severe. Under these circumstances, he wished to have the globe removed.

On examining the eye, it protruded about $\frac{1}{2}$ an inch beyond the other, and was quite fixed, it being unable to follow the movements of the other eye in any direction. I accordingly removed the globe in the usual manner, and in the course of the operation I came upon a tumour which filled a great portion of the orbit, the appearance and size of which is exactly represented in the wood-cut:—



Mr. Nettleship, the curator of the Museum at the Royal London Ophthalmic Hospital, has kindly examined the eye and tumour for me, and given me the following report:—

“The eye was received on January 19, 1872. It was slightly shrunken, but of good shape. The cornea was puckered and irregular, and too small; near to one part of its margin was a prominent granulation-like mass as large as half a pea. Attached to the back of the globe was a tumour about as large as a walnut, which had been unavoidably divided into two parts during the operation. Its widest part was its base, by which it was attached to the sclerotic and which almost completely surrounded the optic nerve. Its free surface was irregularly lobulated and quite distinct from the orbital tissues around it. Less than half of the tumour remained attached to the globe, but the various pieces could readily be put together. The eye, together with that part of the growth which remained attached to it, was divided in the antero-posterior direction, the section passing through the middle of the optic nerve and cornea. The *vitreous* chamber was full of bloody fluid, of reddish brown colour. There was no trace of *lens* or its capsule. The *sclerotic* was, so far as naked eye appearances were concerned, fairly normal, but all the other parts of the eye were so changed as to be scarcely recognizable. The most striking object was a *tumour* which was attached to the optic nerve-entrance and the parts immediately around it, and projected straight forwards into the vitreous chamber. It measured just $\cdot 5$ inch (about 13 mm.) from the centre of its base to its apex; it was about as large as a raspberry, and of somewhat similar shape, its surface being superficially lobulated. Its base was rather more than about 7 mm. ($\cdot 25$ inch) wide, and was attached to the optic disc and surrounding retina. Its apex was continuous, with a soft mass of blood-stained membrane, which was attached in front to the parts in the ciliary region, and was probably derived from the

vitreous. The cut surface of the tumour varied in appearance in different parts. Near the optic nerve it was tolerably firm, uniform, and of a light grayish colour, with slighter mottlings of pink and pale yellow. This firm part passed in front somewhat abruptly into a much softer and less uniform structure, which made up by far the greater part of the tumour. The softer portion looked porous, almost spongy, and presented a great many blood points, apparently the orifices of cut vessels. The *retina* and *choroid* could not at first be separately made out, being in most parts more or less completely fused together into a thick firm fleshy layer of the same appearance as the firmer part of the optic nerve tumour. On careful trial, the retina was found to be quite separate from the choroid for a short distance around the optic disc; in front of the equator the two membranes were separable, although somewhat adherent, but between the equator and the back of the eye only one layer of tissue could be made out distinctly. From the equator forwards the retina was enormously thickened, and especially so at one side of the globe, where, near the position of the ora serrata, it formed a layer nearly $\cdot 125$ inch ($3\cdot 15$ mm.) thick. This extreme thickening of the retina corresponded in position with the nodule of fleshy growth on the cornea. The thickening of the choroid was somewhat more uniform than that of the retina, but was nowhere so extreme; its average thickness was perhaps about $\cdot 04$ inch (1 mm.). The pigment of the choroid was entirely wanting, except in the front of the eye where a thin irregular black line between retina and choroid marked the position of the pigmented epithelial layer. The iris and ciliary body could not be definitely made out. The choroid adhered everywhere most intimately to the sclerotic, so that the two tunics could not be separated without actual cutting. Both choroid and retina had the same pale grayish-pink colour as the optic-nerve tumour. The *extra-ocular growth*, which has been already described in part, had

on its cut surface numerous dark gray mottlings, but its general colour was grayish pink with yellowish patches interspersed; the most highly pigmented parts were at some distance from the sclerotic. The optic nerve (which was cut long) and its outer sheath were fused into a single solid firm mass, the two structures being distinguishable only by the slightly darker colour of the sheath. The surface of both the tumours and of the thickened choroid and retina became slightly concave on section. No juice could be squeezed (except by very firm pressure) from the extra-ocular tumour.

“One-half of the eye was hardened for about three weeks in Muller’s solution; it was then frozen,* and thin sections were made of all the tissues *in situ* from optic nerve, &c., to cornea. Small separate portions of the various diseased structures were examined by teasing, and the complete sections afterwards examined, in order to make out the relations of the various parts to each other. In all parts the tissue which gave to the various structures the peculiar naked-eye characters already described consisted entirely of cells, the vast majority of which were spindle-shaped. As a rule the spindle-cells were rather short and thick and a good many of them would be better described as oat-shaped, while in some parts many were multipolar with short processes, and others had irregular forms. The multipolar and other less usual forms were most frequent in the thickened retina in front of the equator, and in the optic-nerve tumour. Each cell had a large nucleus. In many parts collections of reddish-brown pigment granules were found which, from their colour, irregular size, and usual proximity to blood-vessels, were no doubt the remains of small hæmorrhages; some of the pigmented patches in the extra-ocular tumour consisted of the same granules, but others were made up of pigmented, more or less spindle-shaped cells. The soft porous or spongy-

* In Mr. Stirling’s section cutter, as adapted for freezing by Dr. Rutherford, and modified by Mr. McCarthy.

looking portion of the tumour, springing from the optic disc, differed from the denser part only in containing a vastly greater supply of large thin-walled blood-vessels, the tissue between them consisting entirely of spindle-cells. The mass of fleshy substance on the cornea consisted also of similar cells. I was not able satisfactorily to make out the presence of the sarcoma cells in the sclerotic, excepting in its innermost layers, although in many parts its bundles were separated by masses of apparently cellular structure, and looking like the aggregations of sarcoma cells seen in the other parts of the eye; teasing, however, gave negative results. When examined with low powers, the sarcoma cells were found to be packed in dense masses between the meshes of the connective tissue of the structure in which they occurred. These masses were largest in the extra-ocular tumour, but they varied much in size and shape in this tumour, as well as in the choroid and retina. The sarcoma masses refracted light more highly than the other structures, so that with high powers they sometimes had almost the appearance of masses of granular fat; they could always, however, be separated into cells by teasing. The substance of the optic nerve was entirely replaced by the same malignant growth, which here occupied the position of the nerve-fibres, and proved to be composed of cells similar in general characters to those already described. The inner sheath of the nerve was also abundantly infiltrated with the same morbid growth; the outer sheath, however, in all the sections examined, was found quite free from the deposit. The two sheaths were considerably thickened by hypertrophy of their normal structure, and were somewhat firmly adherent, instead of being united only by lax fibrous tissue; there was, nevertheless, a tolerably distinct line of demarcation between the inner sheath, whose connective-tissue bundles were separated by masses of sarcoma cells, and the outer sheath, which was free from them. Near to the eye the outer sheath was more or less enveloped in the extra-ocular tumour,

but even then it was not infiltrated with the malignant growth.

“In various parts of the retina and choroid there were ample evidences of chronic inflammatory changes, which had occurred previous to, or at the same time as, the production of the spindle-celled malignant growth. The inflammatory process had given rise to the formation of well-developed connective tissue, and to the production of numerous small round lymph-like cells, which differed both in size, shape, and arrangement from those of the sarcoma tissue.

“It was impossible even to guess at the precise part of the eye in which the malignant growth originally began. It is however probable, from the structure of the growth, and from comparison with other intra-ocular sarcomata, that it took origin from the choroid, afterwards spread thence into the retina and optic nerve, and passed either through the nerve or the sclerotic into the lax cellular tissue outside the globe. If this was the case, however, it is very curious that nothing like a circumscribed tumour was formed in connexion with the choroid. From the fact that the eye had been long lost, and that a certain amount of inflammatory hypertrophy was found in the choroid and retina, it is perhaps not improbable that the peculiarly diffused arrangement of the sarcomatous deposit in the choroid was in some way dependent upon changes which occurred before the commencement of malignant action.”

Remarks.—This case presents several points of great interest.

1. It shows that one of the evils which may arise from a lost eye which is undergoing degenerative changes, is that it may become the seat of malignant deposit. It is true that instances of cancerous growths, originating in old lost eyes, are comparatively rare, yet they occur with sufficient frequency to show that the structural metamorphosis which usually, after a time, takes place in eyes

which have been destroyed by accident or disease, is favourable for the production of cancer. A question naturally suggests itself, whether it is possible that the accidental loss of an eye may lead to such a series of inflammatory and degenerative changes as to render that eye liable to the development of cancer within it? In answer to this, I would say that I believe that accidental causes often determine the locality and the first outbreak of cancer; and, further, that if the cancerous affection had not been thus originated, many a patient might have passed through life without having given any evidence of a constitutional predisposition to the disease. In support of this statement, I would refer to the undoubted history so often given by patients, of the first outburst of cancer in different localities of the body. Cancer of the lip frequently originates from an accidental scratch. Cancer of the scrotum from the irritation of soot, and cancer of the tongue will often commence at the point which has been fretted by a rugged tooth. In females the repeated history of a blow on the breast as being the first exciting cause of scirrhus, cannot be ignored. A very remarkable instance of how an accident may produce a wound which will assume a cancerous nature, occurred in a patient under the care of my colleague, Mr. Hulke, in the Middlesex Hospital. An apparently healthy man was smoking his pipe, when his little girl, whom he was nursing, jerked her arm against the pipe stem and caused the end of it to penetrate the soft palate. The wound did not heal, but very shortly became the seat of epithelioma, which spread over the roof of the mouth, and down the pharynx, and ultimately destroyed his life. With these facts before us, it is impossible not to recognize the relationship between cause and effect. Possibly in all such cases there may have been a tendency to cancer in the individual; but I do not think it can be for a moment doubted, that accidental circumstances may give rise to an outbreak of a cancerous

disease which might not otherwise have manifested itself.

In the case which I have related, the cancer originated in an eye which had been long lost. The patient had no history of cancer in his family; he had been always a remarkably healthy man, and my impression is, that if he had had his disorganized globe removed, he might have passed through life without cancer having been ever developed.

As bearing upon the above remarks, I would here briefly allude to a patient who was under the care of my colleague, Mr. Streatfeild, in the Royal London Ophthalmic Hospital, in January of this year. An old man lost the sight of one eye from an inflammatory attack thirteen years ago. The eye remained shrunken and quiet till within the last three or four months, when it rapidly enlarged. Mr. Streatfeild removed the eye, and after excision the globe was found full of a sarcomatous growth which had passed outwards, rupturing the sclerotic, and had formed a large extra-ocular tumour. This specimen will be described fully by the curator of the Museum, in the next number of "The Ophthalmic Hospital Reports."

2. The next points of interest are the peculiar development of the tumour, and the manner in which it had extended itself into the orbit, where it had formed a growth of the size correctly shown in the wood-cut. From the very able report of Mr. Nettleship, the tumour appears to have commenced in the choroid, and afterwards to have extended to the retina. The conical-shaped tumour which sprung from the optic nerve was probably a secondary formation; and my impression is that the disease extended along the optic nerve, through the walls of which the cancer-cells travelled into the orbit. I am strengthened in this opinion from a case of glioma of the retina, which has been lately under my care. In this patient the globe was distended with the tumour; the

sclerotic and cornea were entire throughout, and yet the whole cavity of the orbit was filled with a soft tumour of the same nature as that which occupied the eye. The optic nerve in this specimen presented exactly the same appearance as the nerve did in the case which I have just related.

As gliomatous tumours generally extend by the optic nerve, and their secondary formations are usually in connection with the optic tracts within the cranium, I think we may reasonably infer that the extra-ocular tumours in both these cases were due to the escape of cells through the sheath of the optic nerve into the orbit, rather than that they traversed the sclerotic, which in both instances were apparently entire.

A REPORT ON THE FORMS OF EYE-DISEASE WHICH OCCUR
IN CONNEXION WITH RHEUMATISM AND GOUT.

By JONATHAN HUTCHINSON.

RHEUMATIC Iritis is a disease which in this age of specialisms is very apt to be pushed to the wall. It is nobody's child. Dr. A, writing on Rheumatism, does not mention the eye, and Mr. B, writing on the Eye, dismisses rheumatism with contemptuous brevity. Yet an attack of this form of disease is not pleasant to bear, and many a patient would thank his surgeon if he had any efficient plan for its relief, and still more if he could say anything as to its prevention.

Our ophthalmic investigators during the last twenty years have by no means been idle. Their attention has, however, been absorbed by the cultivation of new fields. The splendid revelations of the ophthalmoscope, the enticing problems as to accommodation and refraction, and the pursuit of pathological histology, have presented attractions which have led to a very natural, but yet undesirable, neglect of topics less novel and perhaps more vague. The result of this has been that, so far from the knowledge of the modern ophthalmic surgeon being better developed than that of his predecessors, in reference to the subject of my Report, it is in fact decidedly less so. Another circumstance has also contributed to throw arthritic iritis, &c., into the shade. I allude to the greatly increased willingness shown by modern pathologists to acknowledge syphilis as the remote cause of all kinds of morbid phenomena. To such an extent has this gone, that some intelligent observers are accustomed to receive the diagnosis of "arthritic iritis" with the utmost distrust, secretly believing that, if the truth could be got at, the iritis would be found, as usual, to be of syphilitic origin.

For myself, I by no means share the suspicions to which I have just alluded. I believe most confidently that iritis due to the arthritic diathesis is a common malady, and that very many cases treated as syphilitic are really arthritic. I believe, further, that it presents several varieties of form, attended by clinical differences, quite sufficient to permit of their being told out into separate groups with convenience to the surgeon. In the following pages I propose to enter in some detail upon the clinical investigation of the maladies in question, and shall make no apology for the liberal citation of cases, since it is most desirable in such an inquiry to keep close to facts, and to secure plenty of them for safe generalisation. Before, however, proceeding to narrate my own cases, the reader will, I think, derive benefit from a glance at the opinions of authors, and I have accordingly, with the assistance of my friend Mr. Nettleship, made the following extracts from some of our standard works. In some instances a few words of criticism are appended.

Part I. Opinions, &c., of Authors.

BADER—"The Human Eye: its Natural and Morbid Changes," 1868.

At p. 95. *Catarrho-rheumatic Ophthalmia* is mentioned in connection with catarrhal ophthalmia, from which it differs by the greater vascularity of the sclerotic; no other peculiarities of the disease are stated.

On Iritis connected with Rheumatism, p. 359.—"An embolic or metastatic iritis has also been described as occurring during or soon after an attack of measles, scarlatina, variola, typhoid or rheumatic fevers."

Rheumatic Sclerotitis, p. 199.—"In rare cases we meet with an acute diffused purple redness, and slight swelling of the sclerotic, with extreme intolerance of light and great pain, brought on by exposure to cold."

STELLWAG VON CARION—"Treatise on Diseases of the Eye."

The index to Stellwag von Carion does not mention the subject of rheumatism, nor does it occur under the heads of *Iritis* or *Sclerotitis*.

MACNAMARA—"Manual of the Diseases of the Eye," 1868.

At p. 134, under "*Hypercæmia of the Sclerotic*" mentions "the arthritic ring," a term applied by him to the zone of congested vessels in the sclerotic close to the corneal edge, and by others to the narrow white ring between that zone and the cornea. He considers that the latter appearance is not characteristic of any particular kind of inflammation, rheumatic or otherwise.

Catarrho-rheumatic conjunctivitis, p. 147.—"The author cannot concede a place to a form of conjunctivitis which is described by most English surgeons as the 'catarrho-rheumatic,' because, in almost all such cases, the deeper structures of the eye are involved." From the above remarks, which occur in the chapter on "Diseases of the Conjunctiva," it is not quite clear how much importance the author attaches to the "rheumatic" element in cases of the above kind, whether he considers the disease to be misnamed "rheumatic," or only misplaced as a conjunctival malady.

On Recurrence of Iritis, p. 283.—"Attacks of serous iritis are apt to recur; at first they are but slight, and of comparatively short duration," &c.

Rheumatism and Gout as causes of Iritis, pp. 290, 291.—"Plastic iritis was formerly supposed, in the majority of instances, to occur among rheumatic patients; but the truth is, we frequently meet with this disease in cases where no suspicion of rheumatism exists." "The main point, however, to bear in mind is, that no form of iritis is characteristic of any particular constitutional dyscrasia; consequently it is an error to describe one form of iritis as rheumatic, another as syphilitic, and so on; these,

and numerous other influences, such as malaria, gout, and the like, are equally frequent causes of iritis."

Rheumatism and Gout connected with Sclerotitis, p. 136.—"When inflammation of the sclerotic does occur it generally depends upon a rheumatic or gouty diathesis," but it is, in his opinion, a very rare disease.

Irido-Choroiditis and Rheumatism, p. 307.—"Syphilis, malarious dyscrasia, and rheumatism are some of the constitutional affections to which this disease may be traced."

SOELBERG WELLS—"A Treatise on the Diseases of the Eye," 1870.

Rheumatic Iritis, p. 159.—"It may also accompany rheumatism in other parts of the body, being evidently produced by the same cause;" but rheumatic iritis "has, in truth, no characteristic symptoms;" "relapses may take place on a recurrence of the rheumatic attack." "The disease often runs a chronic and very protracted course." "A very frequent cause of iritis is exposure to sudden changes of temperature, cold draughts of air, rain, wind, &c. The disease is in such cases often termed rheumatic iritis."

Episcleritis (p. 220) "is perhaps more often met with in persons of a rheumatic or gouty tendency than in others."

Gonorrhœal Iritis.—Mr. Wells has observed Iritis, in connection with gonorrhœa, in cases where the gonorrhœa was associated with rheumatism.

TYRRELL—"A Practical Work on the Diseases of the Eye," vol. i, 1840.

On Rheumatism as a Cause of Iritis, p. 338.—"Pure iritis as a result of rheumatic or arthritic diathesis I believe to be a very rare disease; but as a secondary affection in connection with such peculiar condition of system, iritis is frequent."

Mr. Tyrrell here does not show his usual lucidity.

On "*Catarrho-rheumatic Ophthalmia*" (*Conjunctivo-Scleritis*), p. 377, &c.—Causes, p. 380.—"The predisposing cause is the rheumatic diathesis, for very rarely does the disease appear unless the patient have previously experienced, or evince at the time, rheumatic affection of some other part or parts." "The affection is most common during the spring and autumn, when catarrhal and rheumatic affections prevail; and I can recollect two occasions in which the disease appeared to be epidemic."

Connected with *Gonorrhœa*.—"Some of the most obstinate forms of this disease which I have witnessed have been connected with the constitutional taint, which has originated in gonorrhœa."

On *Colchicum* in *Conjunctivo-Scleritis*, p. 386.—"I have, however, occasionally known it afford relief most rapidly; but I often use it without its producing the slightest benefit as regards the local affection."

He gives five cases of conjunctivo-scleritis in connection with articular rheumatic affection and gonorrhœa or urethral discharge. Some of them relapsed two or three times and in one the urethral discharge was apparently spontaneous.

On *Sclero-Iritis* (*Rheumatic Iritis*) and *Rheumatism*, p. 404.—". . . generally the rheumatic diathesis is well marked in those subject to this disease, the ocular affection being preceded or accompanied by other local evidences of rheumatism," &c.

On *Colchicum*, p. 410.—"I have occasionally employed colchicum in the early stage of the disease, with good effect," &c.

In vol. ii, p. 389, he speaks of rheumatism and gout as causes which predispose to inflammation of the eye after extraction of cataract.

MORGAN—"On Diseases on the Eye," 2nd edition, by France, 1848.

Arthritic or Rheumatic Iritis, p. 140, &c.—Most severe

in absence of other signs of rheumatism or gout: sometimes, however, occurs during a general attack.

It differs from other forms of iritis in the following particulars; the *seat* of pain, which begins in the orbit (not in the globe); the colour of the sclerotic zone is "dull rusty red" (not "bright pink" nor "cinnamon-brown"); the sclerotic injection does not reach to the margin of the cornea, hence there is a white ring of sclerotic immediately external to the margin of the cornea; not much effusion of lymph, and what there is chiefly on posterior surface of iris; sometimes permanent contraction of pupil results without synechiæ, from interstitial deposit.

After repeated attacks, opacity of capsule (not from new lymph deposit upon it) and of lens, are not uncommon. It does not tend to involve any deeper structures of eye than the iris. "Universal dulness and discolouration of iris."

Treatment. Local depletion and counter-irritation. Colchicum. Small doses of mercury (*not to salivate*). Low diet; avoidance of alcohol.

P. 143. Regards rheumatic or arthritic iritis as a "distinct kind" of iritis, which "is always produced by a transfer of that morbid action which we recognise under the terms of gout or rheumatism to the part." He considers that it is generally metastatic, being most severe "during the absence of the disorder in other parts;" indeed "very frequently an attack of gout or rheumatism in the extremities will immediately suspend the inflammatory action which was existing in the iris."

On Sclerotitis and Rheumatism, p. 148.—"Sclerotitis is in fact most frequently met with in individuals who are the subjects of mercurial rheumatism, and have previously been contaminated by a venereal poison." He states also that the iris soon gets inflamed, and implies that the cornea is frequently implicated.

Mercury is his chief point in treatment, not to ptyalism however. Blood-letting too at commencement.

He calls the disease also "Pseudo-syphilitic scleritis."

POWER—"Illustrations of some of the Diseases of the Eye," 1867.

Catarrho-Rheumatic Conjunctivitis, p. 173.—In an article headed "Catarrho-Rheumatic Conjunctivitis," I find no reference to rheumatism at all. When "ordinary catarrhal ophthalmia" is neglected, &c., and especially if patient is advanced in years, the inflammation "is apt to extend to the underlying sclerotic." There may be *ulceration of cornea*. Iritis, and inflammation of choroid and retina, may supervene in severe cases.

On Episcleritis and Rheumatism, p. 257.—"Regarding it as a rheumatic affection," the treatment is iodide of potassium, aconite, and colchicum. "The progress of the affection is almost always chronic, especially if left to itself."

Rheumatic Scleritis, p. 257.—Rare in young people, but "is, perhaps, the most common affection from which old people suffer." "Almost always referred to atmospheric changes, or to some other cause which may occasion a suppression of the functions of the skin." Has been induced in dogs by injection of lactic acid.

"The cornea is sometimes surrounded by a whitish ring." *The pain* is peculiar. At first smarting, then dull aching of brow, temple, nose, superior maxillary nerve. It is worst at night or early in morning. *Vascularity* of sclerotic and conjunctiva. Chemosis absent, or very slight. Generally both eyes are attacked. The inflammation often extends, "in a person strongly predisposed to rheumatic affections, or when the cause is both potent and persistent" to the cornea, iris, and choroid. There is early amblyopia, perhaps from disturbance of retina owing to increased tension from congestion of choroid and iris. Communication between anterior and posterior chambers often closed. The disease often leads

to "those recurring attacks of iritis" which frequently culminate in *glaucoma*.

Treatment. Leeches, opium, quinine, and iron. Aconite and colchicum. Turpentine, calomel and opium, sometimes to salivation.

Rheumatic Ulcer of the Cornea, p. 307.—"After the usual symptoms of rheumatic ophthalmia have endured for a few days," a marginal ulcer forms, deep, of elongated form, having irregularly but sharply defined edges, clear base, hazy margin, and accompanied by severe aching over the brow worse at night. Frequently followed by onyx, hypopyon, or staphyloma corneæ.

This kind of ulcer usually occurs in the "aged and debilitated," and is induced by cold. The "whitish secretion" on the lids is said to be made of "epithelial scales, and *perhaps urate of soda*."

Treatment. Colchicum and aconite, turpentine. Moist heat locally, atropine, opium if pain requires it. Local applications not of much service on the whole.

Rheumatic Iritis, p. 367. — Partly described under *Catarrho-Rheumatic Ophthalmia*. *Exudation* scanty. Disease often remains stationary for some time. Posterior synechiæ after a time. *Pain* considerable, chiefly of brow or nose; worst at night. *Vision* obscured, from turbidity of humours.

WORDSWORTH—"Ophth. Reports," vol. iii, p. 301.

Mr. Wordsworth relates three cases of iritis in association with gonorrhoeal rheumatism.

LAWRENCE—"A Treatise on the Venereal Diseases of the Eye," 1830.

Mr. Lawrence describes two types of disease which he regards as rheumatic affections of the eye excited by gonorrhœa. The first is a muco-purulent conjunctivitis, and receives the name of "Mild Gonorrhoeal Inflammation

of the Conjunctiva;" the second is the more severe scleritis and iritis, and is considered by Mr. Lawrence to be "exactly the same as rheumatic inflammation of the sclerotica and iris occurring independently of gonorrhœa."

True gonorrhœa is not essential to the production of either form of rheumatic inflammation of the eye, although it is probably the most frequent cause. The ocular disease may be preceded by spontaneous urethritis. Rheumatic inflammation of joints and lumbago occur in the same patients who suffer from the gonorrhœo-rheumatic affections of the eye; the urethra, joints, and eye may be affected simultaneously or in succession.

Mr. Lawrence does not actually state that the disease is unsymmetrical, but he seems to imply it. The iritis is usually not very severe, being followed by restoration of vision; it may, however, cause extensive posterior synechiæ.

Details are given of eleven cases of gonorrhœo-rheumatic inflammation of the eye; some other manifestation of rheumatism was present in nine of these. The cases are of great value, and I therefore subjoin a brief abstract of the most important portions of each. The headings in all cases are quoted *verbatim*.

CASE XV.—*Gonorrhœa—Rheumatic swelling of the Joints—Acute external Inflammation of the Eyes, with extensive ulceration of the Cornea.*

A man, æt. 38, had never before had rheumatism. His gonorrhœa did not (he said) come on till six weeks after connexion. Both eyes were simultaneously attacked a month after gonorrhœa began. A few days after the eyes became affected, both wrists and hands and one knee inflamed. The eye disease seems to have been extensive ulceration of corneæ, with some catarrhal conjunctivitis. Vision was much impaired by corneal opacity and the pupil of one eye was immovable.

CASE XVI.—*Discharge from the Urethra with purulent Ophthalmia of both Eyes, and severe rheumatic affections, followed by repeated attacks of Rheumatic Iritis.*

A gentleman, æt. 52, suffered from slight urethritis, probably not gonorrhœal. He then had conjunctivitis, severe, with copious yellow discharge in one eye, slightly in the other. The eyes got better under venesection, &c., but soon after a foot, a knee, and both hands inflamed. The joints were temporarily relieved, but the bad symptoms returned in an aggravated degree soon after, and remained, more or less, for two years. Between the attacks in the joints the eyes again inflamed, and during the next four years six other attacks occurred, ending in nearly total exclusion of each pupil. Considerable stiffness of several joints (and even ankylosis of some) remained several years after the rheumatism. He had no return of urethritis.

CASE XVI.*—*Gonorrhœa, with mild Inflammation of the Conjunctiva.*

In this case a young gentleman during his second gonorrhœa was attacked by symmetrical mucous conjunctivitis; the palpebral conjunctiva was chiefly affected. He had never had any arthritic disease.

CASE XVII.—*Gonorrhœa—Affection of the Hip, and mild Inflammation of the Conjunctiva.*

A gentleman, æt. 33, who had never had rheumatism, contracted gonorrhœa in the beginning of July. A fortnight later, he suffered from symmetrical conjunctivitis, affecting primarily the palpebral conjunctiva. A few days later pain in one hip and thigh came on, and gave him much trouble for several days. He was cured of all symptoms in a short time, but had a relapse of conjunctivitis and hip pain in August, after exposure to sun and dust.

CASE XVIII.—*Gonorrhœa, with affection of the Joints, and mild Inflammation of the Conjunctiva.*

Mr. C. had severe obstinate rheumatism at æt. 32. At æt. 38 he caught gonorrhœa. It was followed by inflammation and

swelling of one knee and both hands, and later on by a short attack of mild symmetrical conjunctivitis.

CASE XIX.—*Mild Gonorrhœal Ophthalmia, with affection of the Joints; subsequently, acute Inflammation of the Sclerotic and Iris.*

Mr. C., married at æt. 23. In the first three years afterwards he had three attacks of mild urethritis, and a fourth more severe in the fourth year. They were not due to contagion. The last attack was attended by swelling and great pain of the left foot. About seven years after marriage he had a severe inflammation of the left eye. It appears to have been an acute kerato-iritis. There was great impairment of vision, due, no doubt, to the fact that "the anterior chamber was filled with a light yellow semi-transparent substance, like jelly, completely hiding the iris and pupil." Vision was completely restored after cupping, leeching, and the free use of mercury. Two months later he caught gonorrhœa, which was presently attended by symmetrical mucous conjunctivitis, and by rheumatism in various joints, one arm, and in the back. The rheumatism hung about him for many months, and, before it was well, he had severe sclero-iritis, first of one eye and then of the other. These attacks were very obstinate, and were treated by the free use of mercury. One finger remained somewhat stiff a year later.

CASE XX.—*Gonorrhœa—Inflammation of the Joints, and Inflammation of the external Tunics and Iris of both Eyes.*

A gentleman caught gonorrhœa at the age of 28. As it was getting better, the right foot, ankle, and knee became inflamed, and shortly afterwards he suffered from symmetrical sclero-iritis, with haze of corneæ. Considerable posterior synechiæ were formed, but good vision was restored. Four years later he had another attack of iritis in the right eye.

CASE XXI.—*Acute Inflammation of the external Tunics, with Gonorrhœa—second Gonorrhœa attended by Rheumatism and Sclero-iritis.*

In this case the patient was a medical man, and was able, therefore, to follow the course of his symptoms with great accuracy. At the age of 24 he had violent gonorrhœa, attended

by acute inflammation of both eyes, with mucous discharge. A year and a half later he again had gonorrhœa of considerable severity. It was again accompanied by ophthalmia, which, after getting quickly well, relapsed and extended to the sclerotic and iris. He then began to suffer from general articular rheumatism, and a kind of see-saw action went on for some time between the eyes and the joints; when one became better the other relapsed, and *vice versâ*. The rheumatism did not leave him for several months, and two years later he had another severe attack in various joints, not, however, accompanied by disease of the eyes.

CASE XXII.—*Inflammation of the internal Tunics and Iris of both Eyes, with Inflammation of the synovial membrane of the Knee, and discharge from the Urethra.*

The patient, a gentlemen æt. 25, was attacked by symmetrical iritis while suffering from slight gonorrhœa of some standing. He soon had, in addition, synovitis of one knee. The joint affection and the urethral discharge persisted for more than a year; the eyes were well in a few weeks.

CASE XXIII.—*Gonorrhœa; Rheumatism, affecting the Back and Limbs; Gonorrhœal Inflammation of the external Tunics of the Eye.*

Mr. F. had a mild attack of gonorrhœa (his second) at æt. 29. It was followed by rheumatism of the feet and one hip, and by two attacks (with five weeks' interval) of inflammation of sclerotic and cornea.

CASE XXIV.—*Gonorrhœa, followed by Inflammation of the Sclerotic and Iris, and Rheumatism.*

Mr. L. had slight rheumatism, in the feet chiefly, with his second gonorrhœa at the age of 25. At the age of 29 he had gonorrhœa a third time. It was followed in a week by rheumatism in the back and in the heels. Six months later he had iritis of the left eye, followed in a few weeks by a similar attack in the right, but not till after the left had got quite well. The iritis did not result in adhesions, and good sight with movable pupils was restored. The rheumatism persisted for a year or more.

LAWRENCE—"On the Diseases of the Eye," 1844.

Rheumatic Ophthalmia, p. 332, &c.—Occurs in rheumatic or gouty subjects. The co-existence of urethral discharge does not imply gonorrhœa; the urethra may participate in the arthritic inflammation.

The disease is usually *caused* by cold. When acute it often goes on to affect *cornea*, producing haziness but not suppuration: sometimes *iris* too. *Pain* more serious around the eye than in the eye itself, worse at night. Not very much photophobia. Conjunctiva not much implicated. White rim round margin of cornea. When *chronic*, it does not affect *iris* or *cornea*.

Treatment. Local, not much use, except local warmth and moisture. Colchicum, calomel and opium (perhaps to salivation). Counter-irritation to nape of neck.

Catarrho-Rheumatica Ophthalmia, p. 336.—So called when *conjunctiva* and *sclerotic* are both inflamed. But it is generally associated with disease of *cornea*, and unconnected with rheumatism.

Rheumatic Iritis, p. 428.—Occurs in rheumatic and gouty people. Iris dull: posterior synechia. Sclerotic congestion ceases before the cornea, leaving the white ring round margin of cornea (especially towards angles of eye). A little white froth on margins of lids. Amblyopia. Circum-orbital pain. Prone to frequent relapses, but sight often almost perfect between successive attacks.

Treatment. Bleeding (local and general). Counter-irritation. Colchicum. Small doses of mercury.

WARDROP—"On the Diseases of the Eye," 1844.

Gouty Ophthalmia.—"However, the pure arthritic ophthalmia may easily be distinguished from the rheumatic" by its effecting chiefly "the capsule of the aqueous humour," producing posterior synechia. The cornea remaining perfectly transparent.

TRAVERS—"Synopsis of the Diseases of the Eye," 1821.

Sclerotitis, p. 129.—"The inflammation of sclerotic sometimes accompanies, and is sometimes vicarious with, rheumatic inflammation."

And p. 295, "The subjects of it are usually reduced and irritable in a high degree, from suffering with rheumatic inflammation in the elbow, knee, or ankle-joints." He thinks abuse of mercury contributes to its production. It is complicated with cloudiness of aqueous and iritis.

"The sympathy of the sclerotic and the ligamentous capsules with the urethra in gonorrhœa, is as unquestionable as that which has been more generally observed, because more frequently occurring, between the latter and the synovial membrane."

Sclerotitis and Gonorrhœa, p. 435.—He further separates gonorrhœal *sclerotitis* from gonorrhœal *conjunctivitis*, which he considers to be produced by contagion.

COPLAND—"Medical Dictionary."

P. 867, &c.—Makes a distinction between, 1. "Common or Phlegmonoid inflammation of the proper external tunics" (Catarrho-Rheumatic Ophthalmia, Mackenzie), and 2. Rheumatic Ophthalmia, and 3. Arthritic or Gouty Ophthalmia.

In the 1st. Both conjunctiva and sclerotic are affected, but *not cornea or iris*.

2nd. The conjunctiva is only slightly involved, but the inflammation may extend to cornea and iris, though generally only in a mild degree. It occurs in "persons of a rheumatic diathesis," and is "not a common affection."

3rd. "Is oftener attended by iritis than the rheumatic variety; but iritis is frequently observed in gouty people without sclerotitis."

Arthritic Iritis, p. 874.—"Inflammation of the iris is frequent in the *gouty diathesis*, but less so in the *rheumatic*, unless as a consequence of rheumatic inflammation of the

sclerotica. In the gouty it occurs most generally in the iris from the commencement . . . ;” but in the rheumatic it rarely begins in the iris. In the *gouty* form “the reddish zone in the sclerotica is of a dull or nearly livid tint, and does not advance to the edge of the cornea, but leaves a narrow white ring between.” “This form of iritis often returns again and again, the eyes recovering almost completely after repeated attacks.”

Treatment. Local depletion and counter-irritation. Turpentine. Colchicum. Mercury injurious, except as an occasional purgative.

DIXON—“Diseases of the Eye,” 1866.

Scleritis and Rheumatism, p. 129.—Attacks of *acute scleritis* “are much modified by rheumatic complications,” and again, “In the severer forms of the acute disease, however, there is sometimes decided evidence of rheumatic complication.”

Rheumatic Iritis, p. 154.—The inflammation of iris often extends to the sclerotic. Attended by much pain. Not much lymph effused, but what there is is behind the iris. The cornea also is often the seat of “mottled opacity,” which “frequently becomes more marked as the inflammation in the sclerotic and iris subside.” Mercury is often necessary when there is danger of posterior synechia.

LAWSON—“Injuries of the Eye, &c.,” 1867.

Rheumatic Iritis, p. 67.—He regards it as a special variety of iritis, characterised by discoloration of aqueous humour, sparing effusion of lymph, great pain and photophobia, frequent recurrence.

Association “with rheumatism elsewhere, such as pains in the limbs or joints; or the patient has suffered previously from rheumatic fever.”

Treatment. Mercury not necessary as for syphilitic iritis. Quinine and iron. Turpentine. Iodide of potassium.

BRODHURST—Art. "Gonorrhœal Rheumatism." (System of Medicine, edited by Russell Reynolds, vol. i, 1866).

Cf. Travers, p. 435.—"Gonorrhœal ophthalmia is much less frequently observed than gonorrhœal rheumatism." When it occurs, "the conjunctiva sclerotic and iris may all become affected. It is not for the most part a severe form of ophthalmia." It therefore differs from *gonorrhœal conjunctivitis*, which is produced by contagion.

WHARTON JONES—Medical Review, vol. xx, p. 277.

"What is called rheumatic ophthalmia appears to be at least nothing more than inflammatory congestion of the sclerotica, usually with more or less implication of the iris."

MEDICAL REVIEW, vol. vi, p. 376 (Review of Chomel and Bouilland on the Nature and Treatment of Rheumatism).

Note on Rheumatic Sclerotitis.—"M. Chomel restricts the application of the term *arthritic inflammation of the sclerotic* more so than is generally done. He recognises it when the sclerotic becomes the seat of pain, and the redness of the conjunctiva is consecutive, without catarrhal secretion, and when these things take place in an individual previously affected with rheumatism, with which this affection has alternated."

WARDROP—A paper on "Rheumatic Inflammation of the Eye," 1818. (Med. Chir. Transactions, vol. x, p. 1.)

It is distinguished by absence of conjunctival inflammation, cloudiness with slight abrasions of cornea.

Character of Pain. It is circumorbital and facial, rather than ocular. It is often remittent. There is not much photophobia.

Sometimes ulceration and sloughing of cornea.

Affects both sexes equally. Generally occurs in adults.

CURRY—"Case of Remitting Ophthalmia," by James Curry, M.D., F.A.S. (Med. Chir. Trans., vol. iii, p. 348).

This is an autobiographic and minute account of no less than six severe attacks of "remitting ophthalmia," with mention of many other milder seizures. The general points to be noticed are that Dr. Curry was severely attacked by intermittent fever in India in early life, and afterwards became subject to regular attacks of acute gout, but there is no mention of rheumatism. These attacks of "remitting ophthalmia" are described as *following exposure to cold*; affecting generally only *one eye at once*; coming on suddenly; accompanied by *pain*, at first as a soreness of the conjunctiva, but soon becoming intense, and affecting the front of the eyeball and the parts around the orbit; remitting, the exacerbation of pain coming on regularly at *night* (in one attack they were diurnal); *dimness of sight* from turbidity of aqueous, and, in the earlier attacks, from corneal haze and a central ulcer; *injection of vessels* (probably sclerotic, but no mention is specially made, "a stream, as it were, of red vessels running from the lower part of the eyeball to the edge of the cornea"). The attacks are noted to have lasted generally *three weeks*, whether mild or severe, and in one or two a tendency to weekly remissions was observed.

With the exception of a corneal opacity, the sight seems to have been quite recovered between the attacks. The author does not seem to think the disease was connected with his gout, though in at least two of the attacks of "ophthalmia" a gouty paroxysm had occurred a little before. There is no mention of *iritis*, but the turbid state of the aqueous probably implied it.

Opium gave greater relief than anything else. Colchicum was not tried, nor mercury.

FULLER—"Rheumatism, Rheumatic Gout, and Sciatica."
*Statements as to frequency of Eye Affections in Gout
 and Rheumatic Gout.*

In writing of rheumatic gout, Dr. Fuller states: "Inflammation of the eye is another complication of considerable importance. It occurred in 11 out of 130 cases of rheumatic gout which were admitted into the Hospital during the time I held the office of Medical Registrar, and it was suffered more or less severely in 14 out of 193 cases which have fallen under my own care at the Hospital. In private practice, too, within the last few years, several gentlemen have consulted me for the same train of symptoms."

In his second edition Dr. Fuller adds the following as a note to the above statements:—"Since the above paragraphs were published, I have seen reason to doubt whether the affection is so common as these figures would appear to indicate, and whether many, if not all, of the cases in which this complication arose may not have been cases of obscure gout, or of gonorrhoeal rheumatism. This at least is certain, that since my attention has been specially directed to this question I have been enabled to trace a gouty or venereal" (gonorrhoeal?) "taint in every case in which the eye has been inflamed in connection with presumed rheumatic gout." He includes in these statements not iritis alone but arthritic inflammation of conjunctiva, sclerotic, and choroid.

Thus Dr. Fuller's testimony strongly supports the belief that gout and gonorrhoeal rheumatism are causes of inflammation of the eye.

BRODIE—"Diseases of Joints," 5th edition, p. 42.

On Gonorrhæo-Rheumatic Iritis, &c.—"I have already adverted to a peculiar disease of which inflammation of the synovial membranes is the principal feature, but in which that inflammation occurs in connection with purulent inflammation of the urethra and sometimes with purulent ophthalmia."

He further says that the cases are not uncommon, are well known to practical surgeons, but that no distinct account of them had been published till the first edition of his work.

“The disease is usually described under the name of gonorrhœal rheumatism, though it is plain from the course of its symptoms, and from the effects of remedies, that it differs from ordinary rheumatism in many essential circumstances; and though there seems to be no doubt that, while it occurs in most instances as a consequence of gonorrhœa, it may take place quite independently of gonorrhœal infection.”

He details the case of a gentleman, aged 45, who had an attack of gonorrhœa. In about a week he had pain in his feet followed by some inflammation of the eyes.” In two or three days more, the pain in the feet was more severe; the conjunctivæ were much inflamed “with a profuse discharge of pus.” There was considerable fever, the synovial membranes of the ankles, tarsus, &c., were inflamed, and in a few days one knee was affected, the inflammation of the eyes and of the urethra having somewhat abated.

A month from the commencement of the illness, the other knee and the shoulder became affected.

Four months after he had fairly recovered, he had a second attack very similar to the first.

Three months later, “he became affected with an ophthalmia of a different nature from that under which he had laboured in the preceding summer. The inflammation was seated in the proper tunics of the eye, and it seemed probable that it would have terminated in adhesions of the iris and destruction of the power of vision, if the progress of it had not been arrested by repeated blood lettings and the use of mercury. He had another attack of the same kind of ophthalmia four years afterwards.” During the next twenty years he had no return of the joint affection, nor of the purulent ophthalmia, “but no

year elapsed without an attack of acute iritis. Each attack left the eye with its organisation more impaired than it had been previously. At last the power of vision in one eye was completely destroyed, while that of the other was very imperfect." He died of an attack of pleurisy. Colchicum, leechings, and mercury were the principal remedial agents employed.

"One gentleman (at the time the notes were taken), had suffered from as many as nine attacks of this complaint. The first took place when he was under twenty years of age, and the others at various intervals in the course of the next twenty years. In one of them the first symptom was inflammation of the urethra, attended with discharge of pus, although, from particular circumstances, he could not believe that he had been exposed to the risk of infection. This was followed by purulent ophthalmia, and that by inflammation of the synovial membranes. In three of the attacks a purulent ophthalmia was the first symptom, which was followed by inflammation and discharge from the urethra, and then the synovial membranes became affected; and in the other four attacks the affection of the synovial membranes took place without any preceding inflammation either of the eye or of the urethra. The disease was not confined to the synovial membranes of the joints, but those of the synovial bursæ were inflamed also. In some of the attacks the muscles of the abdomen were painful and tender, and subject to spasmodic contractions; and there was an occasional impediment to breathing, which seemed to arise from a similar affection of the diaphragm. The acute form of the disease, in this case, lasted from six weeks to three months; but nearly a year generally elapsed before the use of the limbs was perfectly restored. He had an attack in July, 1817; and in the beginning of May, 1818, while he was still lame, he was seized with a violent inflammation of the sclerotic coat and iris of one eye, which was subdued by very copious blood-letting and the exhibition of mercury. He

had another attack of the disorder in the year 1820, and in the winter of 1822 he became affected with an inflammation of the iris and sclerotic coat of the other eye, which was also relieved by blood-letting and the use of mercury. Another gentleman gave the following history. In the year 1809 he had symptoms resembling those of gonorrhœa, and when these had continued for some time, one testicle became inflamed and swollen. This was followed by purulent ophthalmia and inflammation of the synovial membranes. In 1814 he had a similar attack, with the exception of the swelled testicle; and in 1816, when I was consulted he still laboured under a chronic inflammation of the synovial membranes of the knees and ankles, the consequence of the last attack and by which his lower limbs were completely crippled. In a fourth case the patient laboured under a severe ophthalmia, which was followed by inflammation of the urethra, and then the joints became affected; but I had no opportunity of watching the progress of this case, nor have I heard any other particulars of it. In another case the patient laboured under strictures of the urethra. He had four attacks of the disease which has just been described, in the course of a few years. The inflammation of the urethra was in all of them the first symptom, being followed by purulent ophthalmia and afterwards by inflammation of the synovial membranes, and swelling of nearly all the joints. In two of these attacks, he attributed the discharge from the urethra to his having received the infection of gonorrhœa, and in the two others, to the use of the bougie."

"In the ordinary and less complicated cases of this disease, there is generally an attack of gonorrhœa, having its usual origin, which after a few weeks is followed by inflammation of the synovial membrane of one or more of the articulations. Sometimes the symptoms of gonorrhœa subside before the synovial membranes become affected; at other times the two orders of symptoms run their course together. In some instances, the disease subsides

after the lapse of a few weeks ; in others, it is protracted for several months or even for one or two years. The inflammation is for the most part of that kind which terminates in an effusion of serum and not of coagulated lymph. But sometimes it is more intense, leaving the synovial membrane thickened and the joint more or less stiff; and I have known a few instances in which the cartilages became ulcerated, with great pain to the patient, at one time ankylosis being the ultimate result."

WELLER—"Manual of Diseases of the Eye" (compiled especially from Dr. Beer's works. English Translation), 1819, p. 215, &c.

Rheumatic inflammation attacks the outer tunics alone in most cases ; sometimes the iris suffers also. Along with slight congestion of the eye, there is often very severe pain in and near the eye. Muddiness of cornea is spoken of as occurring at a later stage, and this is sometimes accompanied by the formation of small ulcers. Exposure of the head or eye to cold air, especially when the skin is perspiring, and similar influences, are spoken of as causing this disease.

A separate article is devoted to arthritic (*i.e.*, *gouty*), sclerotitis and iritis (p. 220, &c.). The disease generally attacks persons who are evidently gouty, but it may occur in patients who have never had gout ; it may also "be formed from a rheumatic ophthalmia." The "bluish white ring" round the cornea is spoken of as pathognomonic of gouty inflammation. The pupil becomes contracted and at length occluded by "web-like" lymph. The iris becomes discoloured, and varicose vessels may be seen in it at a late stage. Generally only one eye is attacked at once, but the fellow suffers sooner or later. The eye becomes atrophic after repeated attacks of gouty inflammation. Glaucoma is regarded as another form of gouty inflammation.

Local blood-letting and counter-irritation to the spine or behind the ears, and local warmth, are the chief means of treatment. If the patient be gouty, the gout must be treated "according to rule," and the ocular disease may sometimes be relieved by inducing a gouty attack in the feet.

FRICK—"Treatise on Diseases of the Eye." Edited by Welbank (including especially the Doctrines and Practice of Beer), 1826, p. 58, &c.

A good article is devoted to *Rheumatic Ophthalmia*. The disease is primarily a scleritis, but the iris becomes affected in many cases later on.

At p. 70, &c., gouty or arthritic iritis is spoken of.

The account of these diseases is much the same as that given by Dr. Weller.

In a note to the article on "Gonorrhœal Ophthalmia," the Editor, Mr. Welbank, clearly separates between the scleritis accompanying urethral (not necessarily *gonorrhœal*) rheumatism, and the purulent gonorrhœal conjunctivitis.

VETCH—"Practical Treatise on the Diseases of the Eye," 1820.

Regards rheumatism and gout as frequent causes of iritis and scleritis (p. 90). Iritis with a primary inflammation of the sclerotic coat is not a very unfrequent effect of gout in irritable subjects (p. 103). Supraorbital pain is an early symptom. The pain is not constant, and is worse when the patient is warm in bed. The white ring around the cornea and the greater conjunctival congestion, are regarded as the chief symptomatic differences between syphilitic and arthritic iritis. Free and repeated local bleeding, counter-irritation to the neck and neighbouring parts, and more or less mercurialization, are the chief measures of treatment recommended. Protracted

rheumatic inflammation of the eye is often cut short by an emetic.

He also describes a rheumatic scleritis with or without severe conjunctivitis, occurring during gonorrhœa, and relates the case of a Major in the Army who had two attacks of sclero-iritis in association with gonorrhœa and severe articular rheumatism, producing serious damage to the joints. This patient remained liable to returns of gonorrhœal discharge.

MIDDLEMORE—"Treatise on Diseases of the Eye," 1835, p. 562.

"Rheumatic scleritis." He distinguishes between "simple acute inflammation" and "rheumatic inflammation" of the sclerotic. The latter is the more common; it "takes place *most commonly* independently of the present existence of any rheumatic affection, but *not* independently of the former existence of rheumatism; and in very many instances it would seem to be vicarious of rheumatic inflammation elsewhere." In rare cases it co-exists with acute rheumatic affection elsewhere; in some cases the scleritis distinctly alternates with rheumatism in some other part. "It rarely attacks both eyes at once," but has "a strong tendency to relapse." Iritis may supervene.

Gouty iritis (p. 689) may "exist in connection with gout" elsewhere (though not commonly), "or it may alternate with gouty inflammation in some other situation," or it may occur in persons, "who are, in the ordinary acceptance of the term, members of a gouty family. He has seen the pupil occupied by "calcareous deposition, resembling that which occurs from gouty inflammation in other parts" in one or two cases. It is liable to relapse.

Both the above articles are ably written, and show evidences of much original observation and reflection.

JACOB—"A Treatise on the Inflammations of the Eyeball."
1849.

Inflammation of the Eyeball from Gonorrhœa, p. 99, &c.—After mentioning cases recorded by Sir B. Brodie and Mr. Lawrence, in which inflammation of the eyeball occurred, together with urethritis (either gonorrhœal or spontaneous) and synovitis, Dr. Jacob says, "It may, I think, with safety be admitted, that in certain gouty or rheumatic constitutions inflammation of the urethra, joints, and eyes, takes place without any true contagious gonorrhœal disease; and that, on the other hand, inflammations of the joints and eyes, which might not otherwise occur, arise from ordinary gonorrhœa." The disease is, according to the author, specially characterised by affecting chiefly the *cornea*, which becomes cloudy throughout, roughened on its anterior surface, and sometimes dotted with little opacities on its posterior elastic membrane. It often, however, extends to the iris and other parts of the eye. It is liable to relapse on exposure to wet or cold, or on recurrence of certain disturbances of general health. Dr. Jacob has not seen lymph in the anterior chamber in this disease.

There is also "a mild form of conjunctival inflammation, very different from the violent gonorrhœal ophthalmia" and from the corneo-iritis above described, which is a consequence of gonorrhœa.

Gonorrhœal inflammation of the eyeball is a rare disease.

Rheumatic Inflammation of the Eyeball, p. 114, &c.—This disease is a sclerotitis with iritis and corneitis. In mild cases "the membrane of the aqueous humour" is the part most or solely affected. There is generally more congestion, both of sclerotic and conjunctiva, than in other forms of iritis. None of the symptoms, however, are peculiar to *rheumatic* iritis; nor will any of them

“justify the practitioner in pronouncing positively that the disease is true rheumatic inflammation of the eye, unless there be unequivocal proof of the previous or present existence of rheumatic constitution or diathesis, as indicated by inflammation of the joints, with the peculiar accompanying fever, or that disturbance of the system called acute rheumatism; or unless there be at least shifting pains of joints or muscles with brief febrile paroxysms, perspirations, lithic deposits in the urine, and general ill health.” He does not think that *catarrho-rheumatic ophthalmia* should be separated from rheumatic inflammation of the eye as a distinct species.

He thinks that rheumatic inflammation may begin in the retina and choroid, such cases “commencing with what are called amaurotic symptoms, before the sclerotic vascularity or changes in the iris appear.” Such cases are probably instances of painless irido-cyclitis with glaucoma supervening.

On Gouty or Arthritic Inflammation of the Eyeball, p. 139, &c.—Under this heading, Dr. Jacob describes two diseases—simple glaucoma and iritis; the iritis is not distinguishable from the rheumatic iritis. These forms of inflammation often occur in patients who suffer from gout, or who inherit a gouty diathesis, but have not yet suffered from the arthritis. Gouty inflammation of the eye sometimes alternates with gout in one or more joints, and has been arrested by inducing an attack in the foot.

DESMARRES—“*Traité des Maladies des Yeux*,” 1847,
p. 163.

Does not describe “rheumatic ophthalmia,” “scrofulous ophthalmia,” “arthritic ophthalmia,” &c., as separate diseases, but considers that the constitution of the patient may affect the course of an ocular inflammation.

GALEZOWSKI—"Traité des Maladies des Yeux." Première partie, 1870, p. 347.

A short description is given of iritis occurring with gonorrhœal rheumatism. It is generally a serous iritis with deposits on the posterior surface of the iris; but sometimes, especially in relapsed cases, much flocculent lymph is effused, so as even to fill the whole anterior chamber. The disease runs a rapid course, but is very liable to relapse if the patient gets another gonorrhœa.

Episcleritis and parenchymatous scleritis are believed to be often due to the rheumatic diathesis (p. 322 and 326). A short notice is given of gouty iritis (p. 347). The author does not think that the existence of a rheumatic iritis has been clearly proved.

MACKENZIE—"Practical Treatise on the Diseases of the Eye," 1854.

Rheumatic Ophthalmia, p. 506.—Is seated in the sclerotic and capsule of Tenon, and may extend to the iris.

Is distinguished from catarrhal ophthalmia by the *radiated* (not reticulated) arrangement of its vessels.

It is an inflammation of the *fibrous* membranes of the eye, not of the mucous. The pain is throbbing and deep-seated, and more circumorbital than ocular. It seldom attacks both eyes at once. Is generally attended by haze of cornea and *slight* iritis. It is *caused* by cold, especially a stream of cold air playing on the eye while head is perspiring. It is not metastatic with rheumatism elsewhere, and often occurs in persons who have never had rheumatism elsewhere. "Idiopathic sclerotitis" would perhaps be a better name. Perhaps the periosteum of orbit and fascia of temporal muscle are affected wth rheumatism at same time; or the pain may be seat^d in the branches of the fifth nerve to the face, an^d ^{not} ⁱⁿ the eye, to a

great extent, in sympathy with those branches which go to inside of eyeball.

"Catarrho-rheumatic ophthalmia" is treated of in a separate article, and is the name given to a mixed inflammation of conjunctiva and sclerotic, without much conjunctival discharge, often accompanied by chemosis, and frequently complicated by superficial creeping ulceration of cornea, or by interstitial suppuration, followed by hypopyon, iritis, and perforation of cornea.

Rheumatic Iritis, p. 538.—Sometimes affects both eyes at once. The pain and manner of onset (sudden) resemble the same features in scleratitis. Very liable to relapse.

It is never metastatic with rheumatism elsewhere, but often occurs in those who have been long subject to other rheumatic affections. Sometimes caused by irritation of a decayed tooth. Often relapses frequently, or with regularity once or twice a year, sight being more and more injured after each attack.

He speaks also of an "Arthritic Corneitis," p. 530, characterised by roughness of cornea with haze from interstitial deposits, a blueish-white ring close to corneal edge, and sometimes slight iritis. It occurs in elderly people, especially those who have suffered from gout.

The article on "Arthritic Iritis" treats chiefly of glaucoma, partly also of the ordinary forms of rheumatic iritis, and partly of those which are followed by a glaucomatous state.

Gonorrhœal Iritis, p. 552.—"A profuse effusion of coagulable lymph now takes place, speedily filling the pupil, and sometimes falling down in a curd-like form, and in considerable masses into the anterior chamber. In some cases the anterior surface of the iris is covered with lymph, as if coated with white paint. The anterior chamber is sometimes almost filled with the effused lymph. In fact, no other variety of iritis presents this symptom in the same degree."

Generally occurs in young men of scrofulous constitu-

tion, and who are much exposed to cold. Occurs after or before the gonorrhoeal synovitis in the same patients. Very liable to relapse. Rarely attacks both eyes at once. Is very severe, but very amenable to treatment, the abundant lymph being rapidly absorbed.

In his article on "Gonorrhoeal Ophthalmia without Inoculation or Metastasis," p. 480, he quotes Mr. Abernethy (Surgical Lectures), who "had known many people who were liable to rheumatism of the joints, to puriform discharges from the urethra, and to this irritable ophthalmia, and said that these diseases used to alternate the one with the other."

PART II. ORIGINAL CASES.

CASE I.—*Numerous attacks of Iritis—Chronic Rheumatism for twenty years—Hereditary history of Rheumatic Arthritis.*

John Turner, æt. 66, a publican, a large, stout, florid man, consulted Mr. Hutchinson at the Ophthalmic Hospital on December 1, 1870. When admitted, his pupils were found to be covered with thin gray films of false membrane; as to *vision*, he could see to read with difficulty with the right eye, but had very little sight with the left. He stated that he had had repeated attacks of iritis in each eye; the left had been attacked four times and the right twice within a period of eleven years; the first attack occurred in his left eye at the age of 55. He had been liable to chronic rheumatism for twenty years. His first attack of rheumatic inflammation was severe, and laid him up for nearly six months; it occurred at first chiefly in his feet, but latterly had affected especially the back and upper extremities. On examination lips of bone were found on the condyles of each femur. He had been obliged to give up his business ten years before, on account of his health. He had drunk largely during his life of brandy, sherry, and bitter beer, but not much of port wine or stout.

His father, a bailiff and shepherd, was crippled by rheumatism, and died of the disease at the age of 50. He lived well, and was moreover liable to be out in all weathers.

CASE II.—*Iritis in a Man who had had Rheumatic Fever—
History of Iritis with Rheumatism and of Gout in Relatives of the Patient.*

William Joyce, æt. 20, with pale complexion, dark hair, very little hair on his face, was admitted under the care of Mr. Hutchinson, at the Royal London Ophthalmic Hospital, on December 1, 1870, suffering from iritis in the left eye. He had a severe eruption of pustular acne on his face. He was engaged in the manufacture of perfumery, and worked much in hot steamy rooms. With his left eye he could only see 18 J. (with the right 1 J.); there was much conjunctival and ciliary congestion, and there were patches of ecchymosis on the conjunctiva; the cornea was somewhat dull and pitted; the aqueous was dull, and contained some blood at the lower part; the pupil was dilated and circular from the use of atropine, which he had employed before admission, but the iris showed several patches of dull red ecchymosis near its ciliary margin. He stated that his eye had inflamed without known cause about four days previously; it felt hot, and had been very painful. It was his first attack.

A year before this he suffered a severe attack of rheumatic fever, and was laid up for three months; his joints were much swollen. His father, a shoemaker, 45 years of age, had been liable to "rheumatism" in his left knee for several years; these attacks were brought on by exposure to cold, and were accompanied by considerable swelling of the knee; he had drunk much beer in his time. His father (the patient's grandfather), also a shoemaker, aged 72, had been liable to attacks of gout for more than twenty years.

The patient's father, besides his articular rheumatism,

had suffered several attacks of iritis in each eye, and was under Mr. Streatfeild's care for an attack at the time when the patient was admitted at Moorfields.

CASE III.—*Numerous attacks of Iritis and of Chronic Rheumatic Arthritis — Chronic Eczema — Family history of Rheumatic Arthritis and Skin Disease.*

James Bond, æt. 50, a carpenter, plethoric, with dark hair and eyes, applied to Mr. Streatfeild at the Royal London Ophthalmic Hospital, on September 5, 1870, and was transferred to Mr. Hutchinson, on November 7. At the latter date there were extensive posterior synechiæ in each eye, but no actual inflammation was then present. He stated that he had had numerous attacks of iritis, the first attack having occurred nine years before; it was in his left eye, and this eye had altogether suffered much more severely than the right. The attacks were generally of short duration (sometimes only a few hours, and often not more than two or three days), and attended by much pain. When his left eye first inflamed he was suffering from his "first bout of rheumatism;" the shoulders, hips, and ankles were the parts chiefly affected. Since that time he had had occasional attacks of rheumatism, especially in the ankles and the left shoulder. Many years before he had struck his left shoulder in falling. He had for many years been liable to chronic eczema on his face, scalp, and hands; it sometimes got nearly well. He had always lived well, and formerly had drunk a good deal of beer. He did not think that the temperature of the air affected him much, but believed that his rheumatism was generally worse in damp foggy weather. His health in other respects had been good. His legs were oedematous. His urine was clear, and contained no albumen.

His father suffered at about the same age from rheumatic attacks in his joints, apparently of much the same kind as the patient's attacks. The patient's sister had been liable for some time to skin eruption at the elbows.

CASE IV.—*Iritis repeated several times—Severe general Rheumatism for many years.*

Henry Wilson, æt. 37, a lighterman, with fair complexion and grey irides, was under Mr. Streatfeild's care at the Royal London Ophthalmic Hospital in May, and again in October, 1870, on account of iritis. His first attack of iritis had occurred about nine years before; he had had about four attacks altogether; both eyes had been more or less involved, but on the whole he considered that the left had suffered more severely than the right. The iritis generally occurred in autumn.

He had been liable to rheumatism for fifteen years; his first attack was comparatively slight, lasting only about two weeks, and affecting his shoulders and knees. Several years later (*i.e.*, nine years ago, and simultaneously with his first attack of iritis) he had a very severe attack of general rheumatism; it set in suddenly with acute pain in the left wrist, and afterwards affected all the large joints in his body, except those of the right arm. He was in bed for twelve months, during the last three of which he was under Dr. Davies's care, at the London Hospital. He did not improve much under treatment; he was carried into the hospital and carried out again; he was kept upon milk diet, although he had a large appetite. After returning home he used electricity. He had been a moderate beer drinker, but had been temperate in all respects. He did not know much about his relations, but was not aware that any of them had suffered from rheumatism. He stated that he was very liable to catch cold from exposure to the river fogs in following his occupation. His colds were usually accompanied by herpes on the lips, and nasal catarrh, and the herpes was always preceded by shivering. He said that his urine was usually thick when he had a cold, but not otherwise.

He had had a single attack of gonorrhœa many years before, but this was not until after his first attack of rheumatism.

CASE V.—*Iritis in a Patient who had suffered from Rheumatic Fever, Chronic Rheumatism, and Gonorrhœa—Hereditary History of Rheumatism.*

Edward Clay, æt. 28, of dark complexion, was admitted under Mr. Hutchinson's care, at the Royal London Ophthalmic Hospital, on November 3, 1870, for his first attack of iritis. His left eye was affected, and the attack began three days before admission with much frontal pain and congestion of conjunctiva. On admission, there was general brick-red congestion of the conjunctiva, and ciliary congestion; there were several posterior synechiæ and a single small speck of lymph on the margin of the iris; almost the whole pupil was covered by a thin web of false membrane.

For many years he had been subject to rheumatic pains. Five years before admission he had a gonorrhœa, and during its course he had rheumatic fever; he was in bed for ten weeks with the rheumatic fever, and was delirious part of the time. At the time of admission his chief rheumatic ailment consisted of pain in the right knee. Many years before he had suffered much from "gravel," but he had not noticed his water to be thick latterly. He stated that his mother suffered very much from rheumatism, and that her fingers were crippled by it.

CASE VI.—*Case of Recurrent Iritis in which the attacks were very severe, and for some time occurred regularly every year—History of Acute Rheumatism in Childhood—Liability to Sciatica and Lumbago—No attacks of Iritis during last fourteen years of life.*

Mr. B., æt. 46, florid, of sanguine temperament and very active mind. At the age of 10, in consequence, as was believed, of long bathing, he suffered a very prolonged attack of acute rheumatism, during the course of which both eyes were acutely inflamed. Since that time he has had several attacks of rheumatism and five or six of ophthalmia. In January, 1855, his

ophthalmia returned, the previous attack having been seven years ago, and in spite of the treatment adopted by several medical men it persisted, with intervals of a few weeks at a time, until June. On June 2 I was consulted for the first time. I found the left eye much damaged by previous inflammation, and the seat of subacute iritis. The pupil was oval, and the iris adherent by dense bands of old standing false membrane. The right eye was sound, both as regards present and past disease, although it had formerly been acutely inflamed. There were no symptoms of bodily ill health whatever, nor any of rheumatism. I was told that during a former attack he had taken the iodide of potassium (probably in small doses), under the late Dr. Bevan's prescription, and that during an attack, many years ago, in which Dr. Hodgkin had been consulted, mercury had been pushed to salivation with much advantage. The affection had, however, been very obstinate, and had usually lasted many weeks at a time. A pill containing a grain of the acetic extract of colchicum, two of Dover's powder, and one of blue pill was ordered twice daily, and a draught in which were two grains of the iodide and five minims of the tincture of iodine three times a day. After a week's treatment the inflammation quite passed off, and the remedies were discontinued. Within a few days, however, a relapse occurred, and then, in spite of perseverance with the same treatment, the disease passed in a very acute form, and much lymph was effused. We went on with the treatment, using also free counter-irritants, and in the course of about three weeks the disease passed, and no relapse occurred until February of the following year.

Feb. 4, 1856.—When I was sent for on this occasion the iritis had persisted for ten days, and a course of the tincture of guaiacum had been given without benefit. The pain was severe, and the intolerance of light great. Ordered seven grains of the iodide three times daily, and the colchicum pill every night. The improvement was satisfactory, and in a fortnight he was able to go to business again. A relapse, however, followed a week later, and on February 25 I again had to see him. The same medicine was again ordered, and in another ten days he was quite well. During this attack I examined some serum obtained by blistering for lithic acid, but found none. The memorandum that I made at the conclusion of this

attendance was that in case of another attack ever occurring I would either give fuller doses of the iodide or a rapid mercurial course. Mr. B. himself, who had been very observant of the effects of remedies on his most troublesome affection, put great faith in the iodide in the doses last prescribed, and felt sure that he had much sooner got rid of the pain, &c., under its influence than under any other treatment.

Feb. 1, 1857.—Mr. B. again called in on account of his old enemy. The attack had now lasted three days, and he had already begun the iodide in small doses. The cornea was hazy, lymph was effused in the iris, and the sclerotic presented a marked zone of congestion. All bodily functions appeared in perfect order. Four or five blisters had been applied, and had risen freely, but without benefit. I ordered ten grains of the iodide and a scruple of acetate of potash every four hours, with a compound colchicum pill every night at bed-time.

During the evening and night of the day on which the treatment was begun the disease seemed to advance, and the pain was very severe indeed. On the next day improvement began, and on the third day he was able to go to the City to business. He had taken the medicine most punctually, and in the course of 72 hours had at 18 doses taken 3iij of the iodide and 3oz. of the acetate. No inconvenience whatever had been experienced, and free diuresis was the only effect of the medicine which had been noticed. He had never in any previous attack got well nearly so rapidly, and was delighted with the result. During the summer I was in the habit of frequently meeting him, and can state most positively that his health had in no way suffered from the treatment adopted.

In the following year Mr. B. had another attack, which was again treated with tolerable success by the iodide. Each attack had laid him up for a fortnight in the house, and their severity had been such as to make him very anxious to adopt some preventive measure. There did not seem anything in reference to habits of diet which we could alter, and as he lived in a damp neighbourhood, our attention was directed to the propriety of a change of residence. This, however, although almost determined on, was never carried out. Mr. B. has remained under my observation during the last ten years, living in the same house, pursuing precisely the same occupation. His liability to iritis

would appear, however, to have ceased, and he has had no attack since February, 1857. He has, however, had several severe attacks of lumbago and sciatica, but no articular gout or rheumatism.

Jan., 1872.—Mr. B. died of apoplexy of the cerebellum in January, 1871. He had then been fourteen years without experiencing any attack of iritis. He was 61 years of age. His knee joints presented excellent illustrations of the conditions commonly met with in rheumatic arthritis. I have preserved one of them.

CASE VII.—*Acquired Gout of many years' standing—Commencing Atrophy of Optic Discs, and partial Deafness, with signs of Cerebral Disease—The patient, a large smoker, subject to Gout, and has worked in lead.*

Thomas E., æt. 62, has been subject to gout since he was 26 years old, and now has a chalk-stone in his right ear. He believes that he earned his gout by free living, for he was an asylum attendant until about eight years ago, when he was obliged to give up that occupation on account of his gout. His first attack was in the right ankle, but he has since had it in many joints.

He believes that his father never had gout; he was, however, a coachman, and lived freely, and it is possible that he suffered from it to some extent without the patient (who was his youngest son) knowing of it. The patient has a sister younger than himself who has not had gout; neither has an elder brother, who is a painter, suffered from it. He knows of no gouty or rheumatic relatives.

He comes on account of his sight, which has been failing for about eighteen months. He has partial atrophy of each disc, the outer (yellow spot) half being abnormally pale. His pupils act fairly to light, but do not dilate well with atropine.

He has smoked for 40 years. Formerly he smoked largely (an ounce a day), but lately he has not used nearly so much tobacco. It has sometimes made him giddy, but has not otherwise disagreed. For two or three years he has been getting rather deaf, and his memory and intelligence have become impaired. He says he gets "muddled," and he certainly takes a long time to understand and give answer to a question.

After leaving his asylum work he took to painting, but for

about 18 months past has done nothing. He is well acquainted with the symptoms of lead poisoning, and says that he has never had any of them. It is, however, necessary to bear in mind the fact of his having worked in lead when we have to consider the cause of his optic atrophy.

We have three possible causes of this man's eye symptoms. Tobacco may be fairly considered as the most likely of all, seeing that he has been a heavy smoker for many years; and this is not made less probable by the signs of cerebral disease presented in his diminished memory and slowness of intelligence, and partial deafness. Chronic lead poisoning would probably explain the results almost as well as tobacco, if its presence were proved; we must note, however, that the condition of the discs is not that which usually follows the neuritis of lead poisoning, the atrophy being chiefly at the outer half of each disc, and the vessels not being at all markedly diminished. His cerebral symptoms may be equally well accounted for by supposing that he had some senile degeneration of his brain in connection with diseased arteries, or perhaps dependent upon the condition of his kidneys; and perhaps the atrophy of his discs and his partial deafness may depend upon the same cause.

CASE VIII.—Persistent aching of one Eye (the right) associated with Neuralgia on the same side of the face and head in a Woman who inherits from her mother the arthritic diathesis, and has transmitted it to her youngest daughter—The patient Myopic—Her eldest daughter suffering from a peculiar form of cataract, worse in the right eye.

Sarah Ellis, æt. 48, is highly myopic, more so in the right eye. She reads ^{brilliant} with each eye, needing — 3 for the right and — $3\frac{1}{2}$ for the left to see $\frac{20}{50}$ and $\frac{20}{40}$ respectively. Her complaint is of constant aching in the right eye, which has, she says, been present about eight months. This pain is made somewhat worse by use of the eye for small objects, and is diminished by resting the eyes, but it is scarcely ever quite absent. She says the pain "is as if the eye was too large for the socket." The pain often extends from the eye to the right side of the forehead, back of the head, right side of the nose, and sometimes a little way down the

right side of the neck. She never has it on the left side. There is slight ciliary congestion in both eyes. There are no crescents, and no glaucomatous cupping is seen.

She is subject to slight chronic rheumatism in her knees and elsewhere, but has never had any severe arthritic attack. There are small lips on her femoral condyles.

Her mother, now 85, is said to suffer from "rheumatism" in her thumb and legs, and her knees have for a long time been weak. Her mother's brother died of gout after suffering from it for 20 years. Her youngest daughter has had "rheumatic fever," with swollen joints. Her eldest daughter, æt. about 25, has been for several years under Mr. Streatfeild's care for incomplete cataracts. Her right lens was first affected. At present she has marginal and posterior striæ in each lens, and in addition numerous very small round opacities scattered all through the substance of each lens, though most numerous in the right.

CASE IX.—*Several attacks of Gonorrhœa followed by liability to severe Fascial Rheumatism, and to relapsing Balanitis in association with Rheumatism—Recurrent Iritis of both Eyes, with Secondary Cataract of one—Disorganization of the Cataractous Eye and almost complete Blindness of the other—History of remote Syphilis doubtful; certainly no recent Syphilis.*

Joseph K., æt. 35, a short spare man, with dark hair. He is married, and has had five children. It is probable, though not quite certain, that he has never had constitutional syphilis; he admits having had a chancre several years ago, and perhaps it was at the same time (but of this he is uncertain) that he had a sore throat, which he says the doctor considered to be "venereal." He denies ever having had a skin rash.

He has had gonorrhœa several times, and it was not until after one of these attacks that he had rheumatism for the first time. He has since had many attacks of rheumatism, and has often been laid up by it for two or three months at a time. It affects the "muscles," and his joints do not swell.

He has on several occasions had attacks of profuse balanitis, and his impression is that they come on spontaneously in association with his rheumatism; he believes that he generally has both rheumatism and balanitis in the spring and autumn.

He was first sent to me in the spring of 1870 by Mr. Steele, of Reigate, on account of iritis of both eyes; there was also cataract in the right, which, according to his statement, had been forming for several months before he had any pain or inflammation in the eye. He said that people used often to notice it, but that as it gave him no pain he took no heed of it. He had rheumatism very badly when I first saw him.

I again saw him in March, 1871, when he came under care for a relapse of iritis in his left eye, and in the right a corneal ulcer which had perforated before I saw him. His right eye had been inflamed for three months, and his left for six weeks on this occasion. He had had rheumatism with this attack of iritis; and at this time, as well as on his first visit to me, a year earlier, he had profuse balanitis. The iritis in the left eye became worse; the whole iris became muddy, and the pupil obscured; there were no nodules of lymph, and the whole attack was not accompanied by much pain. The right was quite lost when he came to me the second time, its tension diminished, iris in contact with cornea, anterior chamber leaking through a fistula left by the perforating ulcer, and lens opaque. I advised its removal because quite useless, and a possible source of irritation to the other eye. At the same time I did an iridectomy in the left eye. The iritis continued in a slow chronic form, and the artificial pupil became gradually almost blocked, so that three weeks later I made another iridectomy. Vision remained about as before the operations, and was extremely defective. There was never any increase of tension. He was taking bichloride of mercury in full doses, and, later on, iodide of potassium, during the whole of this second attack.

The excised eye was quite disorganized; the choroid was widely separated from the sclerotic, and the retina from the choroid; the spaces between these tunics were filled by bloody fluid, and there was much cholesterine lying loose on the choroid. The epithelium of the choroid was disturbed in places, and accumulated into dense heaps of black. The lens was opaque.

CASE X.—*Chronic painless Iritis ending in Exclusion of Pupil*
—*One Eye affected four years before the other—Long history of*
Sick Headaches and of Epistaxis—Patient Anæmic and weak
when the Iritis began, and afterwards—Family history of Gout.

Wm. Y., æt. 54, was formerly a compositor, but for the last seventeen years has kept a grocery shop. He has rather coarse and almost black hair, and is getting bald on the top of his head. Many of his teeth have decayed. He is pale and feeble, and has been more or less out of health for several years.

His iritis began about six years ago, in the right eye, at a time when he was very debilitated. A year later he was under Mr. Dixon's care for the iritis, and twelve months ago an iridectomy was done in the same eye by Mr. Bader.

Two or three years ago the left eye began to fail. He has had very little pain in either eye, but his wife asserts that there has been a good deal of redness sometimes.

At present his right eye is blind and its tension diminished. It was probably unsound when the iridectomy was done, for no improvement followed that operation. Its artificial pupil is irregular from adhesions. The lens is opaque. The left just sees large letters, and the pupil is excluded.

After the above notes were taken I performed a downward iridectomy in the left, and considerable improvement followed.

This patient has had slight "rheumatic" pains in various parts, but no definite arthritic symptoms. His father suffered from gout in his feet, and used to be laid up with sudden severe attacks.

Wm. Y. has, ever since he can remember, been subject to bad sick headaches. They are often brought on by fatigue, or by eating things that disagree; he is "obliged to be very particular in his food." Has never been jaundiced.

From early boyhood he has been very liable to epistaxis; he attributes its commencement to a severe blow which he had on the nose when he was seven years old; the blow has left a scar. The bleeding has been worst in hot weather and after exertion, he has seldom lost much blood at any one time, but has often felt faint after a bleeding. This bleeding has on the whole diminished as he has grown older.

CASE XI.—*A mild attack of Iritis in one Eye followed two weeks after recovery by severe Iritis of the other, in a young Woman —Arthritic Aching and Neuralgia in the Patient and her Sister, and history of Fascial Rheumatism in the Father.*

Emily M., æt. 20, unmarried, has been a barmaid for five years, and is much exposed to draughts and damp floors. She comes on account of iritis in her left eye; there are no nodules of lymph on the iris, but there is much congestion of the eye and great pain. It has been inflamed for a week. Five weeks ago the right eye was inflamed, but she says that it was never so bad as the left now is, and it got well in about a fortnight. She has never had anything wrong with her eyes before.

There seems no reason whatever for suspecting that she is suffering from secondary syphilis; careful examination of throat and skin, and questioning, give an entirely negative result. She appears to be in excellent health.

She is liable to pain, which she calls "rheumatic," in her left shoulder, and to occasional aching in her knees, and quite lately she has had an aching in her right hand. She is also subject to neuralgic pains on both sides of her head. She considers herself very "bilious," that is, subject to nausea and frontal headache, and she is obliged to carefully select her articles of food.

Her father is subject to severe lumbago, and to shooting pains in his head; he is sometimes laid up by the severity of the pain in his back. Her sister also has the same rheumatic shoulder pains as the patient herself, and is liable to similar neuralgia in the face and head.

CASE XII.—*Numerous attacks of Iritis in one Eye only (the right) —Patient subject to Gout, which he inherits for two generations on the Father's side.*

Henry J., æt. 62, was under care for iritis of his right eye; there were many adhesions, much ciliary and conjunctival congestion, and considerable pain. He came to me first in May of the present year (1871), and again had a slight attack in September.

He says that he has been liable to inflammatory attacks in the right eye for about thirty years, and that the left eye has

never, so far as he remembers, been affected. For thirty-five years he has been subject to gout; the first attack was in his left foot, but since then he has had it in almost all his joints, and about equally badly on both sides. His last attack of iritis and of gout occurred at the same time, in September.

He has urate of soda concretions in the ears, in the fingers, and on the edge of the upper eyelid. The deposit in the eyelid was examined microscopically, and found to consist of small needle-shaped crystals. He has lips on his femoral condyles, and grating in the knee joints.

Many of his relations on the father's side have had gout. His father had it, and his father's father, also a paternal uncle and some male cousins on the father's side. He knows of no female relatives who have had it, either on father's or mother's side.

CASE XIII.—*Hereditary Gout, beginning at the age of seven and ceasing at thirty-five—Influence of abstention from Malt Liquor—Several attacks of severe Rheumatism not leaving permanent changes, in the same Patient—Repeated attacks of unsymmetrical Iritis, some of them in connection with Rheumatic attacks in the Joints.*

Wm. T., æt. 50, a "brassfounder," who works in lead and arsenic, as well as copper, had his first attack of gout at the remarkably early age of 7 years, and after that he had many attacks in various joints. The first attack was in his right foot. He describes characteristic attacks of gout. Since the age of 35 he has had no gout at all, and he attributes this immunity to his having left off beer, &c. Up to the age of 22 he drank a moderate quantity of beer regularly, but since that time he has scarcely ever taken any alcoholic liquor except gin. He has never had symptoms of lead poisoning.

He has also had three attacks of "rheumatic fever." The first came on when he was 22, a few days after he had fallen into the water on a hot day. The last attack occurred when he was 34 years of age. He says that the doctors used to listen to his heart when he had the rheumatic fever. He was, at least once, laid up by it for several months. He describes swelling of all the joints, but says that they did not *shine* as in his gouty attacks.

He asserts that his eyes inflamed for the first time during his first attack of "rheumatic fever," at the age of 22. He has since then had five attacks of ocular inflammation, sometimes in one eye, sometimes in the other, and I have treated him for the last three of these. There has been on each occasion well marked iritis of one eye only, sometimes the right, sometimes the left. The attacks generally come in January, but the last occurred in July. His recent attacks of iritis have not been accompanied by any joint affections. He has slight grating in his right knee, and perhaps small lips on the condyles, but they are doubtful.

His father was, like himself, a brass founder; he did not suffer from either gout or rheumatism. The patient's paternal grandfather, however, had gout severely. No other relations known to be arthritic. The patient is one of seventeen brothers and sisters, fourteen of whom are living.

CASE XIV.—*Unsymmetrical Iritis in a Man who had had severe Rheumatic Inflammation of the corresponding Knee five years before—The Rheumatism following two years after Gonorrhœa—No Syphilis.*

Edwin E., æt. 38, is a traveller in drapery. He is of spare build, has dark hair, and is becoming bald on the top of his head. He came in August with a first attack of iritis in his right eye; there were no nodules of lymph on the iris. The cornea was hazy, and there was much congestion and considerable pain, especially at night. The other eye was perfect, and there were no signs of iritis after atropine.

A careful examination of his throat, skin, and genitals revealed no evidence of syphilis, either recent or remote, and he denied all history of chancre or other symptoms.

He stated that seven years before I saw him he had a gonorrhœa; it was not severe, and lasted about a month. Two years afterwards he had severe rheumatism of his right knee, and was laid up by it for six months; the joint was much swollen. No other joints were affected. Since that attack he had very often had flying pains about the shoulders, loins, &c.

He knows of no arthritic history in the family. His father died at 43 after an accident.

CASE XV.—*Two severe attacks of Rheumatic Fever in youth followed by complete immunity during the child-bearing period, and by another severe attack soon after the permanent cessation of Menstruation—Iritis in one Eye at age of 45—Several relations of the same generation arthritic; no ancestors known to be so.*

Mrs. B., æt. 45, came under my care in September, 1871, for an attack of iritis in the left eye. It had lasted about six weeks when I saw her, and the iris was at that time discoloured and showed many adhesions. Her eyes had never been inflamed before. She gave me the following account of her arthritic complaints:—

At the age of 10 years she had a severe attack of rheumatic fever, with affection of the heart, and was expected to die. At 18 years old she had a second attack of rheumatic fever, after which she remained quite free from any rheumatic symptoms whatever until October, 1870. At that time, after she had been doing a good deal of house cleaning, kneeling about the floors, &c., she was again confined to bed for between two and three months with a severe attack of rheumatism. The knees, hips, elbows, shoulders, feet, and hands were all affected. The finger-joints and knees were especially swollen, and she said that “the fingers were drawn to one side.” It may be noticed in connection with this attack, that menstruation, which had previously been regular, ceased four months before the rheumatism came on. She has never had sick headaches.

Her eldest sister suffers from what the patient called “rheumatic gout,” and a brother, also older than the patient, had rheumatic fever in his youth. This brother’s daughter has suffered from what the patient calls “rheumatism,” and through it has lost the use of one arm. Mrs. B. does not know of any history of gout or rheumatism in her parents or in any members of a former generation, but it is very probable that her knowledge of the history of her ancestors is imperfect.

CASE XVI.—*Numerous attacks of Rheumatic Arthritis and of Iritis in old age—No known family history of Arthritic Diseases—The Iritic attacks generally brought on by exposure to cold wind.*

Sarah W., æt. 70, has had very numerous attacks of iritis in

each eye, and her pupils are now excluded. For several years her lenses have been gradually becoming cataractous.

For about six years she has been subject to attacks of rheumatic arthritis in her knees, ankles, wrists, fingers, &c. The affected joints swell and get stiff, but she is seldom laid up on account of the rheumatism. With reference to the relation between the iritis and the rheumatism, her evidence is that both affections are brought on by cold, and she is emphatic in her assertion that exposure to cold wind is generally followed by an iritic attack. The rheumatism and the iritis commonly occur at about the same time. The earlier attacks of iritis lasted longer and were attended by more pain than has been the case lately; now each attack generally lasts only two or three days. Only one eye is affected at once. She has distinct lips on the condyles of her right, and probably of her left femur also, and there is crackling in the left knee. The joints of her fingers are rather thickened, but neither these nor any other joints are stiff.

There is no definite family history of arthritis. The patient thinks that her mother suffered slightly from rheumatism of her joints in old age, but her account is indefinite.

CASE XVII.—Rheumatic Arthritis and Neuralgia attacking a young man (who inherits the Rheumatic diathesis) for the first time after a Gonorrhœa—Unsymmetrical Iritis several years after the Gonorrhœa—Doubtful History of remote Syphilis; none of the recently acquired disease.

William G., æt. 28, has been for six weeks under care for iritis of his right eye only; he has never had anything amiss with his eyes before. It seems most probable that the attack is arthritic in its nature, although the evidence is not so full as to place the matter beyond doubt.

Six years ago he had "gonorrhœa;" discharge from the urethra continued for three months, and he says that he had some rash on the skin at the same time. His eyes did not inflame then. He married a year later, and his wife has been pregnant four times. There is nothing more than the slightest suspicion to be attached to the history of her children, and two of them, who are brought by the mother, show no evidences of inherited taint. The mother (his wife) has had good health since

marriage, and gives no history of any constitutional symptoms of syphilis.

About six months after his gonorrhœa he began for the first time to suffer from rheumatic pains in his knees and shoulders, and "in his head." The pains were sharp and shooting, commonly lasting only a few minutes, and seldom more than half an hour, and never accompanied, according to his statement, by swelling of the joints.

His youngest sister is also very subject to severe darting pains in her head, "rheumatics in the head," and his father was rheumatic, and used to be laid up with rheumatism in his knees, shoulders, &c.

The patient has decided lips on his right femur, and probably on the left also.

NEW STRABISMUS HOOK—TEST-TYPES.

By GEORGE COWELL, F.R.C.S.,

Senior Assistant-Surgeon to the Westminster Hospital, Assistant-Surgeon to the Royal Westminster Ophthalmic Hospital.

THE strabismus hook, of which the accompanying woodcut is a representation (exact size), has been made for me



by Messrs. Weiss and Co., of the Strand. It is a modification of Von Graefe's hook, although intended for the subconjunctival operation. The end from the extremity to the bend is much shortened; the bend is more abrupt, and a second bend at a very much larger angle is placed at about five lines from the former. It is important that it should be as fine as shown in the woodcut, as if it be thicker, or more probe-pointed, its introduction is apt sometimes, unless great care be taken to detach the conjunctiva a little more than is necessary, a matter of some importance when operating for very slight degrees of strabismus. To place the tendon of the muscle to be divided on the stretch, the hook having been introduced, is held so that the portion of it between the two bends is at right angles to the fibres, and the end very effectually prevents the escape of a portion of the lateral fibres before the tendon is completely divided, an occurrence which is the cause of a large percentage of the failures in operations for squint. The second bend enables the operator to get the handle of the instrument well out of the way of any interference with the play of the scissors.

Messrs. T. Brettell and Co., of 51, Rupert-street, Hay-

market, have printed for me a set of test-types for determining the acuteness of vision. They are drawn up to correspond as nearly as possible with those of Dr. Snellen, of Utrecht, and as supplemental to his well-known book of test-types, will tend to prevent the disproportionate wear and tear of its first two pages, the long useful types of Prof. Jaeger being useless for the expression of V in a fractional form. The limbs are, as in Snellen, in diameter about one-fifth of the height of the letters, and the figures over each size express the number of feet at which the letters are seen by a standard eye. Words of one syllable are chosen, and verses are used, as facilitating the testing of the eyes of those who read imperfectly; and a line of small capitals is introduced where practicable, for similar reasons. There is also a greater variety of the smaller types, commencing with brilliant (1).

Should these types be favourably received, it is proposed to print a piece of *prose*, composed of small words, to correspond. Copies of the above can be obtained of the printers.

INFLAMMATION OF UVEAL TRACT, OCCURRING IN A FATHER AND THREE SONS—RIGHT EYE PRIMARILY AFFECTED IN ALL—LEFT EYE SUBSEQUENTLY ATTACKED IN TWO—IN FOUR EYES THE LENS WAS CATARACTOUS—PROBABLY SYPHILITIC—MOTHER THE SUBJECT OF CONGENITAL CATARACT.

By GEORGE COWELL, F.R.C.S.,

Senior Assistant-Surgeon to the Westminster Hospital, Assistant-Surgeon to the Royal Westminster Ophthalmic Hospital.

OF the family whose cases are narrated below, the first member whom I saw was the youngest son, Walter, now eight years of age. He was brought to the Moorfield's Hospital, in December last, on account of "blindness" of the right eye, and was found to have mischief in the eye, which had produced detached retina. On inquiring for some history of the case, I was told that his two brothers and his father were also "blind of the right eye," and that "the father was blind from cataract." I therefore requested the attendance of these members of the boy's family, and also of a sister a little older than himself, who was said to have good eyes. The various members of the family attended, as requested, on January 4th, and I was thus enabled to ascertain the following particulars, which appear to be of sufficient interest to be worthy of record in the Ophthalmic Hospital Reports:—

1. The father, Ernest L. V. S., a German by birth, 56 years of age, has white hair and florid complexion, presenting somewhat the aspect of an Albino, and is in good condition. He has, however, been so blind for the last three years, that he has had to be led about. The right eye became inflamed (iritis) 17 years ago; the left was similarly affected a few years later. For one of these attacks he was salivated. Nine years ago, his sight having remained considerably impaired, he went to visit his

relations in Germany, and whilst there had an operation performed in both eyes (iridectomy inwards), without, however, arresting the gradual destruction of the visual power.

There is now no perception of light in the right eye, the lens is cataractous and shrunken, and partially detached, so that it shakes about when the eye is moved. There is some slight ciliary injection, with occasional attacks of slight pain, evidently calling for removal of the lens. In the left eye there is perception of large objects, as shadows passing before the eye. There is a diffused opacity of the lens to which there are several adhesions of the iris, and a few striæ, and there are some floating bodies in the vitreous. In this eye there is a bundle of persistent white nerve-fibres on the lower and outer side of the disc. There is a fair pigmentation of the choroid.

This patient denies having had syphilis. He has never had ulcerated throat, but has had a rash on the arms and legs several times. He confesses, however, to having had some 19 years ago, great swelling and soreness of the genitals for about two weeks, but attributed it to having got wet on a journey. This occurred from $1\frac{1}{2}$ to 2 years before the first attack of iritis. The probability of a syphilitic history is strengthened by the fact that his wife had two miscarriages before any living children were born, and a third after the birth of the second son (Ernest).

The wife died about a year ago, 49 years of age. When 8 years old, she was subjected to operation at Moorfields for double congenital cataract, and is said by her family to have been able to see "very well."

2. Charles S., the eldest son, is 17 years of age, and is of somewhat a cachectic aspect. His central incisors are broken away, but the lateral incisors are badly formed and slightly notched, though not thoroughly of the form described by Mr. Hutchinson as typical of hereditary syphilis. The right eye was quite lost ten years ago from iritis. The globe is now soft, the pupil closed, the iris discoloured, and a pinkish zone round the cornea. The lens is evidently cataractous, and the globe has been occasionally painful, although free from pain during the last few months. The left eye has gradually become amblyopic during the last four years. He only reads, with difficulty, letters of No. 20.

The ophthalmoscope shows peripheral detachment of the retina all round, most upwards and as much inwards as downwards. There is also some subretinal effusion around the disc. The eye is hypermetropic.

The right eye was excised on January 15th, and I am indebted to Mr. Edward Nettleship for the following very complete report of its examination.

Immediately after excision it was found to be slightly shrunken, squared, and very soft. The cornea was clear and its anterior surface smooth; at its lower part there was a small semi-transparent elevation, like a granulation or heaping up of epithelium. The iris was yellowish-blue, the pupil small and round, and occupied by an opaque white substance. (After being hardened for two days in a weak (about 1 per cent. solution of chromic acid), the globe was bisected vertically in the antero-posterior direction). The anterior chamber was deep. The iris was found to be closely adherent by its inner part (corresponding to the inner vascular circle) to the lens-capsule, so that the pupil was quite excluded. The substance of the lens was opaque and semi-fluid; the anterior layer of the lens-capsule was opaque, calcified, and much thickened; the posterior layer had many opaque, white dots upon it, but was not thickened.

The *choroid* was in contact with the sclerotic everywhere. At its equatorial part were two large patches of tough, firm, white fibrous tissue; one was on the temporal side, the other on the nasal side, and with the latter the membranous diaphragm was connected, as hereafter described. The epithelial layer was altogether absent in a good many places, but was on the whole sufficiently well preserved to give a tolerably uniform brown colour to the inner surface of the choroid when examined with the naked eye.

Everywhere, however, the individual epithelial cells were much altered; their outlines were often indistinct or altogether lost; their pigment granules scanty, and in many cases collected together to one side of the cells, while in others the individual granules were much larger than normal. Some of the epithelial cells were too small; but a considerable number occurring either singly or in groups, were very much enlarged, and these instead of being flat, had become globular, so that they stood out on a higher level than their companion cells. The enlargement seemed

to be due to distension of the cells, with a colourless, faintly, and finely granular matter; the nucleus was sometimes noticed to be enlarged; the pigment of these enlarged cells was almost always pushed away from the subjacent choroid, and lay in the part of the cell nearest to the retina. The larger groups of distended epithelial cells formed abrupt elevations upon the inner surface of the choroid quite visible to the naked eye. The size of these little hillocks was, however, much greater than would have been the case if they had consisted solely of epithelial cells, for, beneath the cells, between them and the elastic lamina, there could always be seen a quantity of finely granular matter, and this in fact constituted by far the chief part of the larger hillocks. The granular matter closely resembled that which formed the contents of the enlarged cells, from which indeed it could not always be easily distinguished; it generally showed signs of being arranged in more or less globular masses somewhat larger than the enlarged epithelial cells; the outlines of these globular masses were exceedingly indistinct, and the appearance produced was suggestive of an incomplete fusion of the various masses into a single large one; the granular matter of which each globular mass was composed, was arranged indistinctly in fine lines radiating from its centre. Thus, the larger hillocks when divested of epithelium (and many of them were quite bare), had an appearance which reminded one slightly of a compound spherical crystal composed of radiating needles. The bases of the large hillocks (colloid bodies) were more or less contracted, while the entire colloid bodies were often half imbedded in pits caused by depressions in the elastic laminae. No vessels were ever seen to enter the colloid bodies, and the elastic lamina could always be traced beneath them. None of them were calcified, at least not sufficiently to grate when cut or touched; they were probably albuminous. They were very numerous, being scattered about thickly on most parts of the choroid. The elastic lamina was present everywhere; it was not thickened, but was often more or less puckered. This puckering was carried to the greatest extent in the neighbourhood of the optic disc, where it was so extreme as to simulate the papillae of skin. In the same part, around the disc, the choroid was much thickened, and quite devoid of epithelium. The thickening was due especially to changes in the chorio-capillaris, the vessels of which were much

enlarged, and mostly distended with blood; the tissue between the vessels was much increased in quantity, and contained round inflammatory cells. The deeper (pigmented) layer was also thickened, and contained large quantities of pigment cells. In other parts of the eye, at some distance from the disc, the thickening was confined entirely to the chorio-capillaris. The processes of the stellate pigment cells in many instances were deficient, the cells being oval, or even round. Projecting from the optic disc was a soft fleshy mass as large as a small bean, rounded and solid. On its hinder surface, and surrounding the disc completely, was a thin plate of bone forming a shallow cup. This plate of bone was quite separate from the choroid, although almost in contact with it, and it adhered firmly to the fleshy mass in front. There was a central aperture through the bony plate, through which a cord of attachment passed from the disc to the fleshy mass. I was in doubt as to whether or not the mass referred to was a new (inflammatory) growth which had begun to ossify, or the shrunken retina, until I examined it microscopically. There then remained no doubt that it was the retina which had become entirely detached (except from the disc), and was shrunken up into a solid mass. It consisted entirely of elongated Müllerian fibres, and of mesh-works of connective tissue, and indications of the foldings and puckering which it had undergone could still be observed. The layer of bone was intimately adherent to its outer surface, and appeared to have been formed in a layer of fibrous tissue, whose elements ran parallel with the outer limiting membrane, and which was continuous with the edges of the bony plate. The bone contained abundant bone-corpuscles with processes; the long axes of the bone-corpuscles were parallel with the fibres of the unossified fibrous tissue above mentioned. The retina was well supplied with blood. The *ciliary body* was shrunken, but the ciliary processes were well preserved. Stretching across the eye, and forming a complete diaphragm, was a semi-transparent tough membrane, with pigment patches on its front surface. Its circumference was attached to the ora serrata, excepting at the temporal side of the eye, where it was continuous with one of the tough white patches of scar-like tissue on the inner surface of the choroid. At one part of its circumference there was a small crescent of bone about $\frac{1}{4}$ inch long, and of triangular shape on section; this bone

was attached by its base to the ciliary body immediately in front of the ora serrata, while its ridge projected into and was continuous with the membranous diaphragm. The membranous diaphragm was in contact with the centre of the back of the lens, and no doubt represented the very much altered hyaloid. Between it and the retina was a clear fluid containing abundant well-formed cholestearine crystals. The sclerotic was a good deal thickened, especially around the disc and along the upper half of the globe.

In this eyeball there had been inflammation of almost the entire uveal tract, attended by effusion of inflammatory products into the vitreous chamber (at least its front part), and between choroid and retina. Hypertrophy of the retinal connective tissue occurred either before or at the same time as the total detachment of that membrane. Subsequently all the tissues involved underwent shrinking. The thickening of the choroid was partly due to shrinking, but chiefly to hypertrophic inflammation, and the latter change was especially marked in that part of the choroid surrounding the disc.

3. The second son died of rheumatic fever, at the age of 13. His eyes were good. He was left-handed, the only member of the family who was so.

4. The third son, Ernest, is 13 years old. He is as well as his eldest brother, pale, and somewhat badly nourished. He had iritis (right eye) $1\frac{1}{2}$ year ago. There are now several posterior synechiæ, and a cataract of apparently a soft character. The tension of the eye is normal, and there is good quantitative perception of light. The left eye is slightly hypermetropic, with a crescent by the optic disc, $V = \frac{2}{3}\frac{0}{0}$, and he reads No. 1 at 1".

5. Louisa, the next child, is $10\frac{1}{2}$ years old. Her corneæ and lenses are perfectly clear. There is no deafness now, but she is subject to attacks of ear-ache on the left side, two or three times a year. During the attack and for a short time afterwards there is some deafness on that side. She is somewhat pale and anæmic.

6. Walter, æt. 8, is well nourished, and without the slightest aspect of an hereditary syphilitic taint. He bears a remarkable resemblance to his father, and is the only one of the family that does so. He can with a little difficulty count fingers with the right eye, but with the left he can read No. 2 easily. There is

no history of injury to the eye. The dimness of vision has come on gradually during the last $1\frac{1}{2}$ or 2 years. The tension is normal, and equal in the two eyes.

An ophthalmoscopic examination shows that in both eyes the lens is perfectly transparent. In the right eye, the vitreous is slightly cloudy, and contains numerous floating bodies; the retina is detached peripherally in all directions, the width of the detachment varying, and being slightly greater at the lower part. There is also some detachment (effusion beneath the retina) round the optic disc, giving the margin of the disc an indistinct appearance, which led at first to the impression that there was optic neuritis, though a careful examination showed that no neuritis existed. The choroid was throughout thin, and remarkably deficient in pigment. In the left eye, the choroid presented the same appearance; there were a few floating bodies in the vitreous, and the disc was whitish, with a somewhat irregular outline, but with no distinctive signs of previous neuritis. There was no detachment of the retina. Both eyes had a hypermetropic refraction.

Two or three other children died in infancy, one "from convulsions," but I could ascertain nothing with regard to them worthy of remark.

These are the facts, as far as I have been able to ascertain them. The cases, occurring as they do amongst the members of one family, offer many points of interest. The first point that strikes one is the uniform appearance of the disease primarily in the right eye. There is no apparent reason for this, for there seemed to be no special unilateral peculiarities in the family, nor could I hear of any having existed amongst ancestors or relatives. The father was slightly smaller on the left side than on the right, but the eldest son was slightly smaller on the right side. The son who died at 13, of rheumatic fever, was said to be left-handed, the only instance of that peculiarity in the family. Although the right eye was the first to be affected, in two instances, those of the father and the eldest son, the left eye did not long escape; and it is curious to observe the similarity between the affections of the left eye of the eldest

son and the right eye of the youngest. In both these eyes, and perhaps also in the father's left eye, similar changes are going on; detachment of the retina is proceeding from the ora serrata backwards, and from the optic disc forwards, and very considerable light is thrown upon the process that is going on, by the examination of the right eye of the eldest son, which was removed. Again, the frequency of cataract is a prominent feature. It is said that cataract is always secondary. Here it is most unmistakably the result of inflammatory changes in the eye, and in the case of the third son coming on pretty quickly after their first appearance. Two of the affected eyes have, however, escaped, the lenses at present remaining transparent. The question arises, is cataract so common in these inflammatory affections of the eye, or can the frequency of its occurrence in the present family be in the slightest degree explained by an hereditary tendency. It will be observed that the mother was the subject of congenital cataract.

With regard to the history of syphilis, I think that here we have, in the absence of direct evidence, a sufficient number of facts to justify the conclusion that there is a strong probability in favour of the syphilitic nature of these cases. There are the admissions of the father, the aspect of the elder sons, the miscarriages of the mother, and the concentration of the disease in the elder children.

It will be interesting to watch these cases, and to note the changes which seem to be gradually advancing, and not least to ascertain whether and how soon the lenses which are still transparent will lose their transparency.

ON ŒDEMA, OR CYSTIC DISEASE, OF THE RETINA.

BY EDWARD NETTLESHIP, F.R.C.S.,

Curator of the Royal London Ophthalmic Hospital Museum.

THE pathological condition to which the following remarks apply has been already fully and accurately described by Dr. Iwanoff, under the title first of "Colloid Cystic Disease of the Retina,"* and, secondly, of "Œdema of the Retina;"† and a figure of the latter condition is given by him in the *Archiv. f. Ophth.* It was also described and figured by Dr. R. Blessig‡ in a pamphlet on the minute structure of the retina; he regarded it, however, as the normal condition of the retina between the equator and the ora serrata.

With regard to the structure of the retina in the state described by Dr. Iwanoff as "œdema of the retina," and the state intermediate between that and the formation of cysts in the outer layers of the retina, I have nothing of importance to add to the description given by that author. In two specimens, however, which I have examined, the relation of the "œdematous" or "cystic" part of the retina to the outer tunics of the eye was such as to suggest that some inflammatory affection of the sclerotic and choroid, followed by bulging outwards of those tunics, had been instrumental in causing that outward growth§ of

* "On various forms of Inflammation of the Retina," read before the Ophthalmological Society of Heidelberg, Sept. 5, 1864, and published in Zehender's *Klin. Monatsb.* I., vol. ii, p. 415 (1864).

† *Archiv. f. Ophth.* Fünfundzwanzigster b., abth. ii, p. 88 (1869).

‡ "De retinæ textura disquisitiones microscopice. Dissertatio inauguralis, &c." R. Blessig (1855). Dorpat.

§ Mr. Hulke, to whose kindness in overlooking this paper and making valuable suggestions I am much indebted, thinks that the word *growth* should not be used to express the observed changes in Müller's fibres, at least not in the present state of our knowledge. Mr. Hulke suggests "*extension*," or some similar word, which, while it describes the appearances does not involve any

Müller's fibres, which constitutes the most marked feature of the retinal change. In a third specimen I found some evidence of the former presence of adhesions between the outer surfaces of the patches of "oedematous" retina and the inner surface of the choroid, again pointing to the previous occurrence of localized inflammation.

The condition named by Dr. Iwanoff "oedema of the retina," is produced, as he has shown, by the following changes:—1st, a great increase takes place in the length of the vertical connective-tissue fibres of the retina; 2nd, more or less atrophy of the granule layers and of the nerve-cells and nerve-fibres occurs; 3rd, while the above changes are going on, spaces, at first small, afterwards much larger, are formed between the hypertrophied Müllerian fibres. These spaces are irregular in shape and size, and are many times wider than the individual Müller's fibres, being separated from one another by the thickened and elongated bundles of those fibres. They occur first in the outer granule layer, then in the inner granule layer, the inter-granule layer remaining for a time as a horizontal septum between them. This septum finally disappears, and the two sets of cavities coalesce. The overgrowth of the connective tissue pillars may continue long after the total disappearance of the inter-granular layer, and in such advanced cases the retina is seen to consist chiefly of tall thick pillars of straight connective-tissue fibres separated by spaces, the diameter of which is from three to four (or even more) times that of the pillars. The spaces alluded to are stated by Dr. Iwanoff to contain albuminous fluid; in the specimens that I have examined there has been no evidence of the

theory of their causation. I purposely, however, use the term *growth*, because it seems to me that the changes observed in Müller's fibres in this condition can scarcely be accounted for by any other process. If the elongation of these fibres were produced by *stretching* alone, it would not be accompanied by an increase in the thickness of their bundles, whereas increased *thickness* is not less a characteristic of the change in question, when well marked, than increased *length*.

presence in the spaces of any coagulated material, although they had been subjected for a considerable time to the action of chromic acid. The hypertrophied connective-tissue pillars terminate at each end by expanding into the outer and inner limiting membranes, and it is easy to demonstrate that these two membranes are made up by the interlacing of the very numerous and very fine fibres into which every pillar divides after thus expanding. In the neighbourhood of each limiting membrane a number of round granules are found among the Müllerian fibres, and some of these are found scattered throughout the entire length of the pillars. They resemble the normal retinal granules, of which they are probably the remains. Oval connective-tissue nuclei are also found in connection with the fibres, but, so far as my observation goes, they are almost confined to the immediate neighbourhood of the internal limiting membrane, and to the fibres which make up that structure. In one of my specimens there were small cavities also in the nerve-fibre layer. The rods and cones remain unaltered for a long time, until the spaces have become of considerable size; ultimately, however, they disappear. In the specimen which showed all the changes in the most advanced condition, there were in the outer part of the diseased retina, beneath the outer limiting membrane, numerous pigment masses having the size and colour of the choroidal epithelium, from which layer they were doubtless derived.

Dr. Iwanoff, in his earlier publication on cystic disease of the retina, considered that the cavities in the outer granule layer which constitute the cysts, resulted from the formation of "colloid" masses between the overgrown connective-tissue pillars, the "colloid" masses themselves being, at least in part, the result of degeneration of the granules of the outer granule layer. In his later paper on "Edema of the Retina" (which condition he there considers as an early stage of the form described as "cystic"), he suggests that granular or calcareous degeneration of

the capillary blood-vessels may, partly at any rate, explain the changes observed. I have already mentioned that signs of past inflammation in the sclerotic and choroid covering the diseased portions of the retina led me to suspect a mode of origin different from either of those suggested by Dr. Iwanoff. Thus, in two specimens where the changes above described in the retina were well marked, and in which there was no detachment, the corresponding parts of the choroid and sclerotic were thinned, and a uniform bulging of these two tunics outwards was present at the thinned part. The outer surface of the retina in these specimens followed the altered curve of the staphylomatous sclerotic and choroid, being in contact everywhere with the latter. The inner surface of the retina, on the other hand, retained its normal curve, so that the two surfaces were widely separated from each other, being of course connected by the pillars of overgrown Müller's fibres.

The *first* of these specimens is described in the 2nd part of Vol. VII of this Journal, p. 204. It was found in an eye lost by glaucoma, secondary to kerato-iritis. The patient was the subject of inherited syphilis. It is difficult to account for the yielding of the sclerotic and choroid in this case without supposing that these tunics became softened from an inflammatory process, and then yielded to the increased intraocular pressure. This hypothesis is borne out by the degenerated and atrophied state of the choroid at the part referred to, and by the fact that many pigment granules had passed in from it to the subjacent retina; and again, pointing in the same direction, was the presence in some parts of a thin layer of effusion between the choroid and retina. On the other hand, there was no abnormal adhesion between retina and choroid, at the part where the latter bulged outwards, and we can therefore scarcely account for the retinal alterations by supposing the outer layers to have been drawn away, in company with the choroid, from the inner layers. The fact that the inner layers of the retina did not participate in the staphyloma is no proof that the latter was not produced immediately by the increased ocular tension, since great increase

in the intraocular pressure may co-exist with most extensive detachment of the retina.

The *second specimen* was from Jemima S., a single woman, æt. 56, under Mr. Critchett's care. Two and a half years before excision her right eye rapidly failed. She asserted that the eye became blind in a single night, and that the attack was not accompanied by pain. The blindness was permanent, and the eye had occasionally been painful since it became blind. The pain having increased, Mr. Critchett removed the globe. The other (left) eye became glaucomatous three months before the right eye was excised. Mr. Critchett performed iridectomy on the left.

Condition at time of Excision, July 11, 1871.—R. eye quite blind; T + 3. Cornea hazy from epithelial disturbance and superficial vascularity. Pupil wide and round. After excision a commencing equatorial staphyloma was noticed above and below, behind the superior and inferior recti muscles; there were also in other parts lines of dark colour running in the antero-posterior direction, and looking as if produced by splitting of the sclerotic.

The eye was placed for two days in chromic acid, and then opened in the antero-posterior direction.

There was no adhesion between the iris and the lens capsule. The *lens* was for the most part opaque; it was normal in size. The *vitreous* presented nothing unusual to the naked eye. The *retina* was everywhere in apposition with the choroid, but at the staphylomatous parts its outer layers alone followed the altered curve of the attenuated sclerotic and choroid. Its inner layers preserved their normal curve, and the retina thus appeared to be split into two divisions. Between the opposite surfaces were stretched numerous pillars formed of the elongated fibres of Müller. The rods and cones were well preserved in the parts which had undergone the above changes. The conditions resembled those found in the first specimen in all essential respects, but were less extensive both in area and in the distance by which the opposite surfaces of the retina were separated. There were no signs of pigment having passed from the choroid into the retina in this specimen. The *choroid* was everywhere in apposition with the sclerotic, and presented no other signs of disease to the naked eye, except the thinning which had occurred

at the staphylomatous parts. The same remarks apply to the *ciliary body* and to the *sclerotic*.

The *third specimen* was the left eye of Mrs. O., æt. 66, a patient under Mr. Hutchinson's care.

History.—She had a *musca* before the left eye for several years before its sight became seriously damaged. About two and a half years before excision the eye rapidly failed. It was not painful, but “a green gauze” appeared before the sight. When she applied to Mr. Hutchinson, a few days after the failure, there was only slight perception of objects held to the temporal side, and detachment of the retina was diagnosed with the ophthalmoscope. The other eye was nearly perfect. In May, 1871, two and a half years after the failure of the left eye, she again applied, complaining that for four months past the eye had been painful, and that the pain had been still more severe for the last fortnight. The pain was “like rheumatics in the eye” and kept her awake at night. The eye was quite blind; T considerably in excess; a central shallow ulcer was present on the cornea; the lens cataractous; the eyeball much congested. It was excised the same day. The other (right) eye showed floating bodies in the vitreous, a large posterior staphyloma completely surrounding the disc, and some general thinning of choroid; it was found to have $\frac{3}{20}$ of myopia.

The left eye was hardened in chromic acid and then opened.

The *lens* was opaque at the centre, but otherwise normal. The *retina* was detached in the form of an umbrella, and its hinder part, near the disc, a good deal shrunk and thickened. In most places the detachment extended quite up to the ora serrata, but there were still a few spots of adhesion between choroid and retina at a little distance behind the ora serrata. At all these spots of adhesion there were, however, signs of inflammatory changes in the choroid, the retina seeming to have been left behind at these points after the surrounding non-adherent parts of it had become detached. In most cases the whole thickness of the retina had been thus left behind, but in one spot there was every appearance of the inner layers having separated from the outer ones. The former thus took the general curve of the detachment, while the outer layers, being left behind, became stretched, and formed a small cylinder, whose outer end was adherent to the patch of diseased choroid, while its inner end

became continuous with the surrounding retina. The patch of choroid to which the outer end of this hollow portion of retina was attached was about $\frac{1}{20}$ in. (1.2 m.m.) across, and showed some deficiency of epithelial colouring. There were also on the outer surface of the retina three patches or spots as large as small lentils; their outer surfaces were slightly convex. These patches were more transparent than the rest of the retina, but were marked off from it by a narrow border of white opaque tissue. They looked just like small flattened cysts. In minute structure, one of them, which was examined, resembled the two specimens above described in all respects. They could scarcely be called cysts or vesicles, since their cavities were crossed by a number of supporting columns stretched between their inner and outer walls.

In this case it seemed probable that the cyst-like prominences on the outer surface of the retina represented a later stage of the hollow cylinder formed by the outer retinal layers which had remained attached to the choroid, and which was described above. On this supposition the following processes occurred before the formation of these little cyst-like patches:—1st, adhesion of the outer surface of the retina to a small patch of choroid by inflammatory effusion; 2nd, detachment and more or less shrinking of the retina surrounding the adherent patch; 3rd, a separation of the inner from the outer layers of the adherent part of the retina, with overgrowth of Müller's fibres; 4th, owing to the continued retraction of the surrounding detached retina, the part which by its outer layers remained adherent to the choroid, became at last separated from that structure, and formed the outer wall of the cyst-like patch on the retina.

The *iris* of this eye was adherent by its pupillary edge to the lens capsule, its peripheral parts being bulged forwards by distension of the posterior chamber, and being thus in contact with the cornea. The anterior chamber was thus obliterated at its circumference, but of fair depth in the centre. The *anterior chamber* contained opaque, whitish, tough material, which adhered to the centre of the cornea and to the front of the iris. This material consisted of a very regular arrangement of fine, smooth, highly refracting, somewhat brittle fibres, interspersed with a good many large round inflammatory cells. The *vitreous* was, of course, small in quantity. It was fluid, and con-

tained numerous tough webs, stretching from side to side. The *optic disc* was cupped, but the form of the cup was altered somewhat by the detachment of the retina.

In whatever manner these peculiar changes are brought about in the retina, whether by a morbid process starting in that structure, or as the result of changes in the choroid and sclerotic, the term *œdema* seems to me inadequate. The features which above all others strike attention are the elongation and thickening of the bundles of Müller's fibres, and the atrophy of the nerve cells and fibres. "Cystic disease" is less misleading, although the meaning commonly attached to the word does not bring to mind the appearances observed in any, excepting the most highly developed, specimens of the disease under consideration. It is, however, not easy to find any one word which will fairly express the essential conditions of this morbid state, and for the present, therefore, it will probably be better not to disturb the received nomenclature by suggesting any other name.

Fig 1.

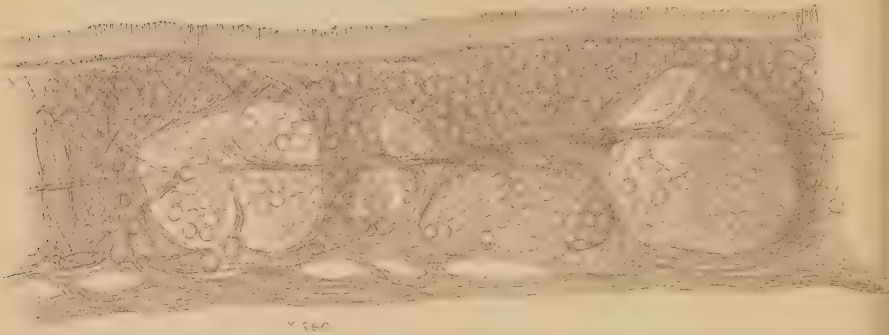


Fig III

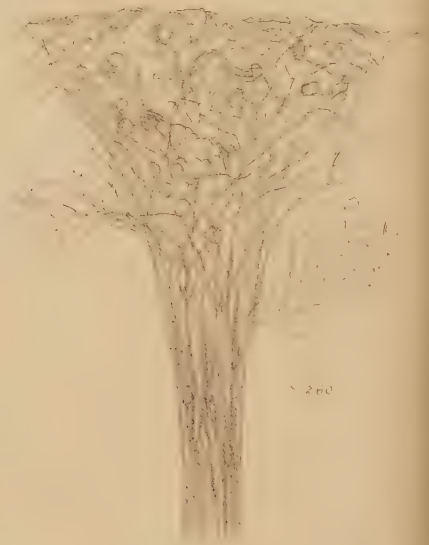
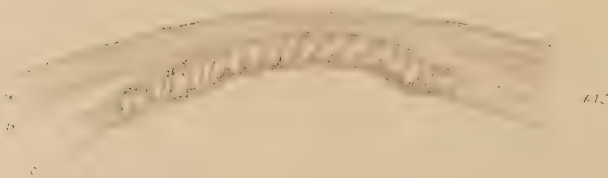


Fig II.



Fig IV



DESCRIPTION OF PLATE IV.

Fig. 1. Vertical section of retina in an early stage of the condition described as "Edema." From the *second* specimen described above. It shows the formation of cavities in the inner and outer granule layers separated by the inter-granule layer. There are also some small elongated cavities in the nerve-fibre layer, apparently formed by separation of its fibres and parallel with their long axes. A few round cells, somewhat larger than the granules and situated between the nerve-fibre layer and one of the large cavities, may be somewhat atrophied nerve-cells; no other nerve-cells are visible. $\times 260$.

Fig. 2. Vertical section of retina in a much more advanced state of the disease. The rods and cones have disappeared. *a.* Internal limiting membrane. *b.* External limiting membrane. A single series of large cavities now exists between the two boundaries of the retina, the inter-granule layer having disappeared. The granules of the inner granule layer are much diminished in number. Those of the outer granule layer are somewhat fewer than in the normal state, and probably also spread through a wider space; mixed with them are numerous brown pigment masses from the choroidal epithelium. Between the two limiting membranes stretch the elongated fibres of Müller; their very great increase, *both in length and thickness*, of these bundles will be noticed. From the *first* specimen above described (Ophth. Hosp. Rep., vol. vii, p. 204). $\times 55$.

Fig. 3 shows the manner in which the pillars of overgrown Müllerian fibres terminate in, and form the inner limiting membrane by breaking up into a mesh-work of branching and interlacing fine fibres. Oval nuclei (some of which are represented rather too large) are seen in connection with some of the fibres. From the specimen which furnished Fig. 2. This figure is amplified to the same extent as Fig. 1. $\times 260$.

Fig. 4. Section through sclerotic choroid and retina, from a specimen in which well-marked "œdema" of the retina occurred at the seat of slight equatorial staphyloma. From the eye which furnished Fig. 1. *a.* Sclerotic. *b.* Choroid (left unshaded by an error in engraving). *c.* Retina with large cavities in the granule layers. The staphylomatous *thinning of the two outer tunics, with increased thickness of the retina*, well seen. $\times 15$.

CURATOR'S PATHOLOGICAL REPORT.

By EDWARD NETTLESHIP, F.R.C.S.,

Curator of the Royal London Ophthalmic Hospital Museum.

THE present Report contains an account of the most important and interesting eyes removed in the hospital between July 1st and December 1st, 1871. The arrangement is nearly the same as in the last Report. Specimens marked * have been preserved in the Museum. The numbers refer to the Museum register of specimens.

EYES LOST BY INJURY.

The first four of the specimens described below illustrate the effects of recent wounds involving all the coats of the eye.

The two next (Nos. 91 and 82) are good examples of cyclitis with consecutive inflammation of vitreous, &c., coming on without any apparent immediate cause in eyes which had been contused a long time before.

Nos. 93 and 49 need no comment.

The last specimen, No. 87, resembles many of the eyes lost by purulent ophthalmia, in showing pigmentation of the retina following choroiditis.

58. *Small Puncture through all the Tunics with a clean Awl five days before Excision—Suppuration of Vitreous—Commencing Suppurative Inflammation of Retina and Choroid.*

Henry S., a boy, æt. about 12, under the care of Mr. Hutchinson. Five days before excision he ran a clean shoemaker's awl into his right eye; no part of the instrument remained in the globe. On the day of excision there was much congestion, and moderate pain. T—. He said he could still just see light with this eye. A wound was found at the inner part of the sclero-corneal junction; it was filled with lymph and prolapsed iris, and a mass of yellow lymph passed from the inner aspect of the wound to-

wards, and apparently into, the lens. The iris was discoloured and vascular. The aqueous was dull, and the cornea slightly hazy.

The globe was put into Müller's solution for six weeks, and then bisected in the antero-posterior direction.

The *vitreous* was gelatinous and semi-transparent, but contained many large masses of pure pus, many of which were connected with the hyaloid. The semi-transparent parts were quite structureless, and contained no cells of any kind.

The *retina* at the optic disc, and for a considerable distance around it, was somewhat thickened. It was slightly detached in a few places from the choroid, and these detachments generally occurred at spots where the retina was in contact with a thick mass of pus in the vitreous. In vertical sections made near the optic disc, numerous pus-like corpuscles were found in the nerve fibre layer. The rods and cones in these sections were well preserved, but the granule layers and nerve-cells were by no means well-defined, and the vertical connective-tissue pillars were obscure. These appearances might have been produced by general swelling of all the elements, or by the effusion of a coagulable liquid between the retinal elements. In specimens taken from near the ora serrata numerous pus cells were also found.

The *choroid* was examined at the equator of the eye, and there found to be full of pus-corpuscles. They were present both in the chorio-capillaris and in the deeper layers. In some parts the hexagonal epithelial cells were normal, in others they were irregular in shape; there was no conclusive evidence of proliferation in them. The anterior chamber was rather deep, and was filled with semi-opaque, soft, rather tough material, which consisted of fine, sharply defined fibres, for the most part nearly straight, and running in every direction. Among these fibres were a few large corpuscles of considerably greater diameter than white-blood corpuscles. The lens appeared normal in size and position; it was not examined microscopically.

61A. *Rupture of Eye—Excision eight days later—Commencing Neuritis.*

John M., æt. 35, under the care of Mr. Hulke. Eight days before excision his left eye was kicked by another man. He stated that the eye "closed up" after the blow, but that it had

not been very painful. At the time of excision the cornea was universally opaque and yellowish, and there was a large hole in its upper part, apparently from sloughing. The conjunctiva was much chemosed, and at the upper part formed a large swelling, which overlapped that part of the cornea. This swelling was produced chiefly by the lens which escaped from beneath the conjunctiva during the operation, and was found to have left the globe by a large rent in the sclerotic near the insertion of the superior rectus. The lens was still within its capsule, and was quite transparent. Most of the vitreous escaped during excision; it contained many blood-clots.

The *retina* was everywhere *in situ*. There were several patches of hæmorrhage in its substance at the fundus, and one especially well-marked at the region of the yellow spot. The veins were dilated and somewhat tortuous. The greater part of the retina was perfectly transparent, but in the neighbourhood of the disc it was beginning to become opaque and white. The opacity chiefly followed the course of the vessels, one of which was slightly obscured. This change involved the margin of the disc, which was thus rendered slightly "woolly."

Some sections of the *retina* and *hyaloid* were made after the specimen had been placed for six months in Müller's solution. In the nerve-fibres of the optic disc there were a large number of pus-like corpuscles, and they were most abundant in, if not confined to, the immediate neighbourhood of the large blood-vessels. No inflammatory corpuscles were found in any sections of retina. In all the sections of retina which were examined the layer of rods and cones, of nerve-fibres and nerve-cells, looked healthy. The granule and molecular layers did not show well; their elements were ill-defined, perhaps from serous infiltration.

The *hyaloid* on the disc, over the physiological cup, contained a large number of pus-like corpuscles of the same size and appearance as those in the subjacent nerve-fibre layer.

The *choroid* was examined only close to the optic disc; in that position its deep layer was remarkably opened up, so that spaces of considerable size existed between its stellate pigment cells. This condition might have been produced by œdema. The large vessels appeared of unusual dimensions, as if dilated, but they were almost empty; probably their blood had been accidentally washed out.

- *56. *Perforating Wound in Ciliary Region by chip of Metal—Excision eleven days later—Foreign body in Vitreous—Vitreous containing Blood and Inflammatory Products—Slight Effusion between Retina and Choroid—Thickening and Distortion of Outer Layers of Retina, probably by Inflammatory Corpuscles.*

Henry K., æt. 21, under the care of Mr. Hutchinson. Eleven days before excision his left eye was wounded in the ciliary region by a piece of metal. It was doubtful whether the foreign body remained in the eye or not. Vision was at once reduced to perception of shadows, and a few days later was lost altogether. Great pain set in a few hours after the accident, but this symptom disappeared several days before the eye was removed.

Condition at date of excision:—"There is a wound in the ciliary region coming up to the corneal edge, and filled by lymph. Anterior chamber of good depth. Iris discoloured. Cornea transparent. Much congestion. T —. The other eye good."

The globe was hardened for twenty-four hours in chromic acid, and then divided (through the wound) into equal upper and lower halves.

The wound was filled by toughish gray-white fibrous tissue containing many oval nuclei and free round lymph corpuscles. The *lens* was transparent, of normal shape, and not displaced. Its *suspensory ligament* was infiltrated with coagulated albuminous fluid, in which were a few small (? inflammatory) cells. That part of the *vitreous chamber* close to the wound, and extending thence to the back of the lens, was occupied by material having a finely fibrous structure, and which was infiltrated to a varying degree by round nucleated pus-like cells, about as large as white blood-corpuscles. The fibres alluded to were short, straight, and finely beaded, and they crossed each other at various angles. The vitreous at the upper and back part was fluid; elsewhere it was somewhat too firm and mixed in many parts with large dark blood clots, while at the lower and back part it was suppurating freely, and was very adherent to the retina. In the midst of a large mass of blood at the lower part the chip of iron was found.

The *retina* was rendered opaque by the chromic acid. Its veins were distended with blood. In the lower part of the globe, passing from the disc downwards, and in contact with the sup-

purating part of the vitreous, were large patches of retina raised considerably above the general surface, apparently by thickening of the retinal substance. These patches were abruptly raised from the surrounding retina. In all other parts the retinal surface had its normal curve. Sections were made through one of these raised patches, and the neighbouring normal-looking retina. At the part which formed the projection the retina was somewhat thickened, and its outer layers (especially the outer granule layer) were much distorted, so that in vertical sections their outlines formed lines sharply curved inwards and outwards, instead of being parallel with the inner layers. This distortion began gradually in the inter-granule layer, and attained its maximum at the outer limiting membrane. The outer-granule layer in the distorted parts was thickened, and contained a very large number of granules or cell elements, so that in minute isolated portions of it several cells or granules were often seen forming vertical lines by the side of, and within, the fibres of Müller. These cell-elements were for the most part roundly oval and finely granular, but not a few were somewhat smaller, homogeneous, more highly refracting, and quite round. It was the latter which were noticed to be free among, and by the side of, the Müllerian fibres, while the granular, oval, larger ones were structurally connected with those fibres. Probably the round, highly refracting cells were results of inflammation. The rods and cones were not well preserved anywhere, being represented by a structureless layer of granular matter. In those parts where the outer granule layer was thickened and undulating, the altered rods and cones were mixed with numerous spherical, apparently structureless, or granular, masses, and with loose granular matter. These spherical masses were probably indicative of choroidal inflammation, and it is probable that some of the apparent thickening of the retina at the raised patches was due to subretinal effusion of which these masses formed part. The inter-granule layer was thickened, and in it the fibres of Müller were remarkably distinct, and appeared to be increased in transverse diameter. In the nerve-cell layer there were, besides the normal ganglion-cells, a large number of round, clear, highly refracting corpuscles without processes, much smaller than the nerve-cells. They were slightly larger than the granules of the inner granule layer, to which in other respects they bore a close resemblance. The

nerve-fibre layer did not show any well-marked evidence of inflammatory changes, though in a few parts there were doubtful appearances of lymph corpuscles amongst nerve-fibres. In the thinnest sections, and in isolated bundles of fibres, no undoubted inflammatory corpuscles could be made out. The hyaloid covering those portions of retina which were examined contained numerous elements of various sizes, from pus-like corpuscles to large nucleated cells.

The *choroid* was examined in sections only near to the foreign body, and even there not exhaustively. It appeared quite normal at that part.

101. *Wound two weeks before excision—Small bit of Iron in Vitreous—Lens wounded, and softened in centre—Suppurative Inflammation of Choroid, Vitreous, and Retina.*

William B., æt. 21, under the care of Mr. Couper. Two weeks before excision his right eye was wounded by a small piece of cold iron. A week after the accident he could still see shadows. Pain began to trouble him a few days before the globe was excised.

Condition at date of excision: "No definite scar can be seen. Perhaps a spot of unusually congested conjunctiva and sclerotic at the upper part may mark the entrance of the foreign body. Lens opaque. T+. No perception of light. The other eye has been nearly blind since childhood, from an injury by a pineapple leaf."

The excised eye was placed for four days in chromic acid, and then divided in the antero-posterior direction into equal halves.

A very minute piece of iron, not larger than a small pin's-head, was found in the lower part of the vitreous a little to the outer side of the middle line. The *cornea* appeared to the naked eye to be normal. The *pupil* was blocked by a plug of yellowish lymph, which adhered both to the iris and the lens. The *lens* was transparent, except at its central parts. In its axis, passing from before backwards, were several streaks and patches of whitish opacity, and the whole of the central part, instead of being firm, was much softened, softer even than the peripheral portions. The opaque streaks referred to consisted of (a) ill-formed lens-fibres; (b) spherical and irregularly shaped globules of oil or

myeline, few in number; (c) very numerous small spherical highly refracting corpuscles, about as large as red blood-corpuscles; (d) large corpuscles of finely and faintly granular appearance, somewhat widely spread and never crowded together. The *vitreous* near to the back of the lens consisted entirely of well-formed pus-cells. The hyaloid was everywhere suppurating freely, and close to the optic disc it formed a thick pad of pus. The central part of the vitreous was still clear. The *retina* was everywhere in contact with the choroid. It adhered strongly to the hyaloid, and could very readily be separated from the choroid, the hexagonal cells of which adhered in great numbers to its outer surface. In the neighbourhood of the disc it was very soft, enormously thickened, and consisted almost entirely of pus corpuscles. The *choroid* was thickened everywhere, but more so at the back of the eye than elsewhere. Vertical sections showed that the thickening was due to purulent infiltration of the choriocapillaries, which layer indeed consisted of little else but pus-cells. The epithelium, where present (for much had become detached with the retina), and the elastic lamina appeared normal. The deep layer of the choroid seemed to be, in the sections examined, quite free from inflammatory products.

91. *Suppurative Cyclitis and Inflammation of Vitreous; Retina near Optic Disc containing lymph corpuscles—Blow on Eye eighteen months before excision; sight damaged—Spontaneous acute Inflammation three weeks before excision.*

William W., æt. 52, under the care of Mr. Soelberg Wells. Eighteen months before the excision his *left eye* was struck by the handle of a barrow. Sight was much damaged, and was never after the accident good enough to enable him to read with this eye; but it was not entirely lost until three weeks before excision. He had an attack of pain and intolerance of light several months before he came under care. Three weeks before the eye was removed it suddenly became painful and inflamed, and all remaining sight was lost. The pain continued until the globe was excised. It was removed on September 19, and placed in a weak solution of chromic acid until November 3.

The *cornea* was ulcerated deeply between the margin and the centre, and at one spot perforation had occurred and slight pro-

lapse of iris had taken place. A vertical antero-posterior section was made through the eyeball. The *lens* appeared healthy to the naked eye, but had fallen forwards from the loss of the aqueous.

The *vitreous* was everywhere semi-opaque, and at one part contained a large collection of recent pus composed of well-formed corpuscles. The hyaloid everywhere contained proliferating cells, and capsules in which several new cells were enclosed. Webs containing these cells likewise passed in all directions through the vitreous. The changes in the hyaloid were most advanced in a patch about half an inch (13 mm.) long which lay over the ora serrata. In this part the hyaloid was much thickened and quite yellow with purulent infiltration, and more adherent than usual to the ora serrata. It is probable that the suppuration started from this area into the vitreous.

Sections through the *ciliary body* and *retina in front of the ora serrata* showed both these parts enormously swollen from infiltration with pus-cells. The same condition was present in that part of the *choroid* immediately behind the ora serrata, but in a less marked degree; while sections of the choroid near the disc showed nothing abnormal, except a somewhat granular appearance. Even in the parts of the choroid and ciliary body where the inflammatory changes had gone furthest, all the layers of the uveal tunic could easily be made out.

The *retina* in the neighbourhood of the optic disc was somewhat thickened, in other parts it appeared of normal thickness, excepting as above stated, in front of the ora serrata. Vertical sections through the retina close to the disc, and through the disc itself showed the nerve-fibre layer abundantly infiltrated with inflammatory corpuscles, having the size and appearance of pus corpuscles. A few of them perhaps existed in the layer of nerve-cells, but none in any of the deeper retinal structures. These products of inflammation were far most abundant on and close to the optic disc, but did not pass downwards so far as the lamina cribrosa. They rapidly diminished in number away from the disc, and were comparatively scarce at $\cdot 125$ inch (3.12 mm.) from its edge. No sections were examined further from the disc than $\cdot 125$ inch (3.12 mm.).

The layer of rods and cones was represented, in the sections examined, by a structureless layer of granular matter. In one spot, close to the disc, this layer became suddenly much thick-

ened, and the whole thickness of the retina was raised up over the little hillock thus produced. This granular layer was most likely in part the result of effusion from the choroid which occurred unequally in different parts. The other layers of the retina near the disc were normal, and the fibres of Müller were well preserved and unaltered.

*82. *Acute Irido-cyclitis, with great inflammatory thickening of part of Ciliary Body, &c.—Inflammation of Vitreous, and commencing Suppurative Neuro-retinitis—Bulging in Ciliary region from partial rupture of Sclero-corneal junction by pressure of inflamed tissues within—Blow on the Eye twelve months before.*

Walter B., a healthy looking boy of 11 years, under the care of Mr. Hutchinson. About five weeks before excision his right eye became "blood-shot;" it was well when he went to bed over night, but was red and inflamed the next morning when he woke. The congestion persisted. The sight did not begin to fail till five days later, and in a few days the eye was blind. He had no severe pain at any time. On admission, September 4, 1871, the following note was made:—"Right eye quite blind. T —. Large vessels of conjunctiva dilated and tortuous. Anterior chamber half full of dark blood, on which (or more probably on the posterior elastic lamina of the cornea) are a number of opaque white dots, somewhat larger than those usually seen in keratitis punctata. The iris is inflamed and the pupil very irregular. The ciliary region is everywhere bulging, but this is most marked at the upper and inner part where the sclerotic is quite thin and the pigment begins to show through it.* There are several whitish spots in the conjunctiva covering the ciliary swelling; perhaps they are enlarged glands."

No satisfactory cause for the loss of the eye could be ascertained. The only facts bearing at all upon it were as follows:—(1st) Twelve months before the attack he received a blow from a fist on the eye; it resulted in an ordinary "black eye," but no special notice was taken of the occurrence, and the boy believed the sight was not in any way injured. (2nd) His mother

* The dusky colour, supposed to be due to ciliary pigment, was probably caused chiefly by the distended blood-vessels of the ciliary swelling. As will be presently seen, the pigment of this part had become scattered throughout the inflammatory tissue.

stated that six weeks before excision, and one week before the eye began to inflame, the patient had carried a heavy bundle of clothes on his head for a quarter of a mile to his employers. The "bundle was as much as he could stand under." When he came home after carrying the bundle his head and neck were bent over to the right side, and he could not move his head from side to side from stiffness. He complained of pain in his neck for several days afterwards, and a week after the occurrence his eye inflamed. It must be confessed that neither the blow on the eye a year before the destructive inflammation set in, nor the sprain of the neck from carrying a heavy weight on the head, can be called a satisfactory cause of the irido-cyclitis which followed them. No other cause could be found. There were no evidences of inherited or acquired syphilis. He had never had rheumatic fever, nor any infectious disease, excepting measles. He had not been subject to epistaxis.

The globe immediately after excision was put for a week into chromic acid, and then divided vertically in the antero-posterior direction through the optic nerve and cornea.

The *cornea* in thin sections showed abundant, but patchy, infiltration of its deeper layers, near its margin, with round pus-like corpuscles. Elsewhere it appeared normal. No deposits could be identified on its posterior surface apart from the mass of coagulated blood.

The lens was perfectly transparent, and appeared in all respects quite healthy. The ciliary region was the seat of the most marked changes. Over rather more than half the circumference of the globe, chiefly at its upper part, all the tunics were very much thickened in the ciliary region, and the swelling noticed during life was formed by the most thickened part of the sclerotic and ciliary body. The ciliary body was covered on its inner surface by a layer of soft white tissue, which was continuous with the vitreous humour. The *vitreous* itself contained many opaque threads and bands near to the diseased portion of the ciliary body, and these opacities were found to be due to the presence in the vitreous of numerous large round nucleated cells, and branching connective-tissue corpuscles. Elsewhere the vitreous looked healthy to the naked eye. Thin sections were made through the ciliary swelling so as to include all the tunics. From the outer surface of the sclerotic to the inner surface of the

suspensory ligament measured somewhat more than .1 inch (2.5 mm.) at the thickest part. When magnified 30 diameters, the following conditions were noticed :—The *suspensory ligament* was much thickened, forming the layer of soft white tissue above noticed on the inner surface of the ciliary body. The ciliary body itself, including the ciliary muscle, was also greatly thickened ; while its most anterior part, the ciliary process, was represented by a mass of colourless inflammatory material, in the midst of which the outline of the ciliary process could just be traced as a somewhat irregular pigmented line, which became continuous in front with the iris. The inner layers of the sclero-corneal junction had become ruptured by the pressure from within, and were widely separated from one another by the inflammatory mass which occupied the position of the ciliary process, and bulged outwards as well as inwards. The outer layers of the sclero-corneal junction, however, had yielded gradually to the pressure and had not ruptured. The inner (ruptured) layers of cornea and sclerotic were quite clear and healthy looking, whereas the outer layers were much thickened and rendered opaque for some little distance on each side the sclero-corneal junction by inflammatory deposit. The ciliary process, which, as has been stated, could be traced as a line of pigment, had become invaginated into the aperture formed by the partial rupture of cornea and sclerotic, and it was almost in contact with the concave inner surface of the bulging outer sclero-corneal layers. Thus in all probability the greater part of the inflammatory material derived from the ciliary process itself had collected on its *inner* surface, forming the thick mass which has been mentioned as projecting inwards. The ciliary process thus became pushed outwards through the aperture in the deep layers of the sclero-corneal junction ; the superficial layers of the outer tunic, being softened by inflammatory infiltration, yielded gradually. The peripheral part of the iris was implicated in the inflammatory process, being enormously thickened and continuous with the mass which occupied the position of the ciliary process. The above changes were found, on examination with higher magnifying powers, to be due to the infiltration of all the tissues with lymph or pus cells. In the ciliary process they were so numerous as quite to have destroyed all its characters excepting the pigment cells. In the outer layers of the sclerotic and cornea

near the sclero-corneal junction, the normal fibrous bundles were widely separated by closely-packed masses of the same inflammatory corpuscles. There were, however, none whatever in the inner (ruptured) layers, which were on the contrary quite healthy, and were separated by a tolerably definite line from the inflamed layers. The subconjunctival connective tissue was also quite free from inflammatory cells. In the ciliary muscle and iris the corpuscles were also crowded thickly together so as greatly to obscure the normal structures. In the ciliary retina and suspensory ligament they were much less numerous, though still present in very large numbers; and on the inner surface of the suspensory ligament was the hyaloid, containing the elements already described in the anterior part of the vitreous. The *retina* was everywhere in contact with the choroid. It was nearly opaque from the action of chromic acid. Its inner surface was sprinkled with a number of small white elevated dots, apparently swellings of its substance, and it was thickened at and around the optic disc. Several sections were examined from the neighbourhood of the disc, and one section taken through the disc itself. On the disc, and in the retina close to it, the nerve-fibre layer was infiltrated with numerous round lymph-corpuscles, having the size and characters of white blood-corpuscles. These were most plentiful in the sheaths of the large vessels on the disc, but they were also scattered about in considerable numbers at a distance from blood vessels. I could find none of these inflammatory cells in any sections of retina excepting close to the disc. The layer of rods and cones was somewhat imperfect, and its elements were rather ill-defined, but these appearances were very likely in part accidental or due to chromic acid. None of the other layers showed anything amiss. I did not recognize any elevations of surface corresponding to the white dots noticed with the naked eye, and it is probable that none of them were included in the sections examined. The *choroid* was examined close to the disc, and appeared, when highly magnified, to be normal, excepting that its epithelial cells were ill-defined and had lost their outlines somewhat. No prolonged examination of the choroid in other parts was made, but vertical sections from various regions examined cursorily appeared healthy.

- *93. *An unusually large foreign body (glass) retained in the Eye for six weeks—No suppuration.*

Sarah S., æt. 18, under the care of Mr. Couper. Six weeks before excision her left eye was wounded during an explosion of gun-cotton. At the date of excision the *left eye* was shrunken, red, painful, and quite blind. There was a large scar in the cornea, but the rest of the cornea was clear. The right eye was irritable.

After excision a large hard body could be felt within the globe. A scar $\frac{1}{3}$ inch (8·15 mm.) long was found extending vertically through the upper part of the cornea and sclerotic. When the eye was opened a large piece of glass was found inside it. The piece of glass was triangular in shape, about 1 inch (25·3 mm.) in vertical length, ·5 inch (12·5 mm.) wide at its base, and ·083 inch (2·1 mm.) thick. The base of the triangle nearly corresponded with the scar of the wound; the apex was sharp, and was firmly fixed against the opposite side of the globe close to the insertion of the inferior oblique. It had perforated the retina and choroid, and rested against the inner surface of the sclerotic. The *vitreous chamber* contained, besides the glass, bloody fluid and flocculent bits of greyish material. The hyaloid was in some parts detached from the retina. The *retina* was semi-transparent and detached in folds. The subretinal space contained flocculent greyish material, probably altered blood-clot. There was no subchoroidal hæmorrhage. The lens was absent.

- *49. *Concentric shrinking and thickening of all the Tunics of an Eye which was severely wounded eleven years before excision—Chronic Sympathetic Ophthalmitis of the other Eye.*

This specimen is a good example of considerable and equal shrinking of all the coats of the eye, without any relative displacement, except slight folding of the retina.

Thomas J., æt. 16, under the care of Mr. Wordsworth.

Eleven years before excision his right eye was wounded by glass; sight was lost either immediately, or after a short interval, but he stated that he had neither pain nor other inconvenience after the first effects of the accident had passed off. About twelve months before he came under care, the other (left) eye began to fail, and it continued gradually to get worse.

At the date of excision, the right eye was much shrunken, and there was a large transverse scar on the cornea. It was not painful. The left eye showed slight ciliary congestion; the pupil was fixed and rather large; there was considerable irregularity of the corneal epithelium opposite to the palpebral fissure, forming a band of little eminences across the cornea in that situation. V. 18 J. This eye improved somewhat after excision of the right.

The right eye, after excision, was placed for a few days in chromic acid, and then bisected in the vertical direction from before backwards.

The *iris* was adherent to the greater part of the corneal scar, by means of connective tissue containing oval nuclei and round inflammatory corpuscles.

The *cornea*, examined in vertical sections with the microscope, was normal except at the scar. At that part the epithelium on the anterior surface abruptly ceased; while on the hinder surface the posterior elastic lamina at the corresponding part showed a rupture of continuity, on each side of which it was puckered. Through the aperture the iris was adherent to the tissue of the cornea proper. There were vessels in the cornea at the scar. Near the anterior surface of the scar calcareous masses were imbedded in the corneal tissue.

The *lens* was shrivelled, flat, and of stony hardness, and quite opaque. The posterior layer of the lens-capsule was not adherent to the lens, but the anterior layer could not be identified. There was considerable thickening about the region of the *ciliary muscle*.

The *retina* was shrunken, thickened, and slightly detached in folds from the choroid; it was semi-opaque. When magnified it was found to consist solely of retinal granules, and elongated, but thin, connective-tissue bundles. The *choroid* was much thickened. Its epithelium was absent almost everywhere. The thickening had occurred chiefly in the choriocapillaris, and the production of inflammatory products had there been accompanied by the formation of numerous large spaces (resembling dilated thin-walled blood-vessels) in the choroidal tissue. The *sclerotic* was greatly increased in thickness, especially at the back of the eye.

*87. *Chronic Cyclitis and (probably) Choroiditis, with extreme (secondary) Retinitis Pigmentosa, in an Eye lost by a perforating wound of the Cornea forty years before excision—The Eye slightly shrunk—Lens partly absorbed.*

Emily L., æt. 42, under the care of Mr. Hulke. At the age of twelve months her left eye was wounded by a pair of scissors; she believes that the scissors perforated the coats of the eye. It was occasionally painful until about the age of seven years, after which time it remained quite quiet until six weeks before excision, when it became painful and inflamed. The right eye became irritable for a few days before the operation.

At the date of excision the left eye was slightly shrunk, its cornea was opaque, and contained calcareous matter, and there was a doubtful appearance of a scar at the upper part. After removal it was placed in chromic acid for a week, and then opened by an antero-posterior vertical section.

The *iris* was in contact with the cornea, and strongly adhered to its upper part, confirming the suspicion formed before removal as to the seat of the former wound.

The *lens* was represented by an opaque yellow nucleus situated near the seat of the scar. The lens capsule, suspensory ligament, and neighbouring hyaloid, were very much thickened over the inner $\frac{2}{3}$ of the circumference of the eye. At a part a little behind where the margin of the lens should have been, where also this fibrous thickening was greatest, there was a narrow band of bone developed in the fibrous tissue; it formed part of a circle parallel with the ora serrata.

The *retina* was semi-opaque when the eye was opened (probably this was from the action of chromic acid), and everywhere in contact with the choroid. It was very highly and very curiously pigmented. The pigment occupied a zone about $\cdot 3$ inch (7.5 mm.) wide at the equator of the globe, the hinder border of the zone being rather abrupt, while its front part passed more gradually into the unpigmented peripheral retina. Examined with the naked eye the pigment was found to consist of islands and spots of various sizes, and often separated from one another by wide branching bands of unpigmented retina. When magnified forty diameters, the dark islands were seen to be formed by densely black roundish spots, intermixed with many lines

and branching figures of pigment, while on the outskirts of the pigmented zone were numerous small round dots of black, which had not yet become large or numerous enough to coalesce and form islands of considerable size. Narrow pigmented lines were seen in the middle of, and following the course of, some of the wide bands of unpigmented retina which separated the large dark islands from each other. These narrow lines evidently accompanied large retinal vessels, and it will thus be seen that, in some cases at least, the larger retinal vessels, although themselves bordered by pigment, were separated by bands of unpigmented retina several times their own width, from the large insular collections which formed so marked a feature in this specimen. The region of the yellow spot was occupied by a patch of coal-black pigment, quite abruptly defined, and separated by a wide tract of unpigmented retina from any other similarly diseased part. Examined under a power of forty diameters in vertical section, the greater part of the pigment was found to be in the inner layers of the retina. In some parts, however, the outer retinal layers contained pigment, and when this was the case the colouring matter was often noticed to be continuous with the epithelial pigment of the choroid, which in such parts (as well as in some other places) was disturbed. No more minute examination was made of either retina or choroid.

EYES LOST BY PURULENT OPHTHALMIA.

Nos. 74 and 113 illustrate very well that form of retinitis pigmentosa which is commonly found in eyes lost during infancy from perforating ulceration of the cornea and excised many years later. Such eyes are generally (putting aside the corneal irregularity or bulging) of good shape and normal size.

The lens is commonly absent, or, if it did not escape through the hole in the cornea, is much shrunken. The vitreous is fluid. The retina and choroid show evidences of atrophy following inflammation, and in the retina, at the equator, is a quantity of pigment distributed chiefly along the blood-vessels.

74. *Perforation of Cornea and loss of Lens during Purulent Ophthalmia in Infancy—Excision nineteen years later—Old Choroiditis and Secondary Retinitis Pigmentosa.*

Annie R., æt. 19, under the care of Mr. Hutchinson. Her left eye was lost by purulent ophthalmia in infancy. She applied at the hospital because the eyeball had become tender when touched.

Condition at date of Excision.—Left cornea opaque and uniformly staphylomatous. The eyeball is very tender but not congested. The right eye is good, with the exception of a nebula on the cornea.

The eye was divided transversely a few days afterwards. There was no trace of a lens. The *iris* was thin, and torn into irregular shreds, which for the most part adhered to the cornea. The *choroid* showed abundant evidence of past inflammation, its epithelial pigment-cells being much disturbed. These cells were heaped up into dots or patches in some parts, while there were many other spots from which the epithelium was absent. There was one especially large patch of heaped up pigment at the equator, and to this patch the retina adhered firmly. The *retina* was everywhere in contact with the choroid. Near to the equator it showed a few dots and streaks of pigmentation, the streaks in all probability following the course of retinal vessels. On examining the relation between the pigment in the retina and the patches of disease in the choroid, no uniform correspondence could be found between them; sometimes a line or patch of pigmented retina lay over a patch of old choroiditis, while at others the subjacent choroid was apparently healthy. No microscopical examination of the structures of this eye was made. It is preserved in the Museum of the London Hospital Medical College.

113. *Choroiditis, with Secondary Retinitis Pigmentosa, and formation of Bone in Retina—Vitreous Fluid—Lens absent—Eye lost by Corneal Inflammation and Perforation nineteen years before excision.*

Mary B., æt. 19, under the care of Mr. Hulke. Her right eye was lost by some "inflammation" when she was a few months old; she believed that the disease was not the result of any injury. She stated that the eye had never been inflamed since

she could remember, but that it had ached occasionally when she had overworked the other eye.

Condition at date of Excision.—The right eye had no perception of light. Its cornea was densely opaque and white. The left eye was good, and there were no opacities on the cornea. It was not, nor had it been, painful.

The right globe after excision was, by accident, left in water for nearly two days, it was then put into absolute alcohol for twelve days, and at the end of that time divided transversely.

The *lens* was absent. The *iris* was frayed out on the back of the cornea, and adherent to it.

The *vitreous* was represented by a watery fluid containing a curdy white precipitate (coagulated albumen). There were no traces of fibrous webs in the vitreous chamber.

The *choroid* was, in most of the many sections examined, thin from atrophy of its stroma. Its epithelium was absent in many parts.

The *retina* was *in situ* everywhere. It was very highly pigmented in all parts excepting near the disc. The pigment (seen under a magnifying power of 30 diameters) very clearly followed the course of the retinal vessels, both large vessels and capillaries. Vertical sections examined under a magnifying power of 250 diameters showed that the retina was much wasted at the pigmented parts. In parts where there was no pigment the various layers of the retina could be made out, excepting the bacillary layer which could not anywhere be traced. The retinal pigment was generally situated in the inner layers, but in not a few places it was found in the outer granule layer, and in some sections it could be seen in all parts between the external and internal limiting membranes. The choroidal epithelium was generally absent beneath and near to the pigmented parts of the retina, but might sometimes be seen slightly separated from the elastic lamina, and apparently passing into the subjacent retina.

At one part of the pigmented portion of retina was a long, narrow patch of bone. It was thin, irregular in outline, and projected on the inner surface of the retina. It was about .2 of an inch long (5 mm.), and about half that width. From its borders spurs or processes of bone passed out into the retina around. A large retinal vessel, containing blood, passed through its middle, and was imbedded in it. Well formed lacunæ and

canaliculi were present in abundance. The retinal capillaries in the neighbourhood of this bony patch were in most cases in an advanced state of fatty degeneration, and formed a network of oil globules. The bone was irregularly mixed up with patches and lines of pigmented unossified retina, especially at and near its margins.

EYES LOST BY SYPHILIS.

Nos. 76 and 78 were obtained from patients in the secondary stage of syphilis, the former about eight months, the latter one and a-half years after the primary disease. No. 76 illustrates the active stage of secondary syphilitic inflammation of the uveal tract, retina, and vitreous; while in No. 78 we see the results left by a somewhat similar state of things, atrophy having followed a state of acute inflammation.

**76. Syphilitic Iritis, followed in one Eye by Plastic Cyclitis, Inflammation of Vitreous, Choroiditis with Subretinal Effusion, and Retinitis—Large Growth of Organised Lymph from Ciliary body—Excision about eight months after commencement of Iritis.*

Mary Anne M., æt. 25, unmarried. Under the care of Mr. Critchett. About Christmas-time, 1870, she had severe secondary syphilis, bubos (non-suppurating) in each groin, double iritis, ulcerated throat, rash on the skin, and glandular enlargements at the back of the neck. She was under care at another hospital, and was salivated as she asserts until two or three weeks before she came under Mr. Critchett's care. Her left eye got well; the right improved for a time, but became worse again about three months before admission; it was extremely painful throughout the whole attack. On admission at the end of July, she had very severe iritis in the right eye, and synechiæ, but no inflammation in the left. Mercurial inunction was ordered. A fortnight later the following note was made:—"Has been slightly salivated for several days. Is cachectic and feeble. There are maculæ (the remains of the syphilitic rash) on her face. Cervical glands enlarged; throat not now ulcerated.

Left Eye well, excepting posterior synechiæ. *Right Eye* very painful and quite lost. T—. Great congestion, both conjunctival and scleral. Cornea steamy. Iris pushed forwards; no anterior chamber. The lower and outer part of the ciliary region is occupied by a large bulging mass, resembling a ciliary staphyloma in form, but of brownish grey colour, instead of bluish. It involves the edge of the cornea, and appears to drag the iris somewhat downwards." The eye was excised the same day, August 15. The tumour gave way at its apex when the globe was accidentally dropped, but none of the contents of the globe escaped from the small aperture thus formed. The eye was hardened for 24 hours in chromic acid, and then divided into unequal halves in the antero-posterior direction, the section passing through the tumour and leaving the optic nerve entire in the lower and outer half.

The *iris* was covered on its anterior surface by a layer of tough pale material consisting of large nucleated inflammatory cells imbedded in a granular and indistinctly fibrous basis. The pupil was closed. The *lens* was transparent. The *tumour in the ciliary region* had, in section, a light greyish-pink colour, interspersed with many blood spots (divided vessels). It was of tolerably firm consistence. The intra-ocular portion of the growth formed a thick layer on the outer and inner surfaces of the ciliary body, from the ora serrata to the ciliary processes, and it involved also the peripheral part of the iris on its front surface. At the sclero-corneal junction the growth from the ciliary body appeared to have burst through the coats of the eyeball, and thus to have grown outwards and formed the extra-ocular protrusion seen during life. This extra-ocular part had spread backwards between the sclerotic and conjunctiva, and gradually tailed off a little behind the equator. That part of the growth which involved the ciliary body consisted of large round corpuscles with slightly granular contents, and some of them containing pigment. They were all much larger than pus corpuscles. The part situated on the outer surface of the sclerotic consisted of corpuscles having just the size of pus cells. They were crowded together between the conjunctiva and sclerotic, and the superficial bundles of the latter were separated by larger and smaller groups of the cells, but none passed for any considerable distance into it. In all probability the cells of the *ciliary* growth

were derived from the pigmented epithelial layers of the ciliary body. The growth contained a great many large thin-walled vessels which were full of blood. The *vitreous* was much altered. The part in contact with the ciliary growth had become converted into a tough, stringy, whitish tissue, which adhered very firmly to the ora serrata, and less so to the inner surface of the ciliary growth and the back of the lens-capsule. Passing backwards from this focus of disease the vitreous became less and less opaque and stringy, but was nowhere clear. At the lower and back part of the eye a considerable part of the vitreous was quite fluid. The opaque strings and webs consisted of corpuscles for the most part somewhat larger than pus corpuscles, imbedded in a finely fibrous and minutely granular matrix. The hyaloid was much thickened, and showed the same structure in all essentials as the opaque webs passing through the vitreous; some of its cells contained several nuclei, and in some parts the corpuscles were collected into groups or nests, though no brood-capsules were seen. The tough and much altered vitreous, above described as in contact with the ciliary growth, was composed of the same round corpuscles, but they were mingled with a large number of others in various stages of elongation towards fibres; so that this part of the vitreous would probably have developed into fibrous tissue and not passed into pus.

Between the retina and the choroid there was a widely-spread layer of effusion. In most parts it was so thin as not perceptibly to alter the retinal curve, but near the upper and inner part of the equator (on the side opposite to the ciliary growth) some large patches of retina were quite raised up from the choroid by the effusion, looking as if they had been blistered. The subretinal effusion was present as a firm white layer around the optic disc, as well as over the greater part of the upper and lateral portions of the choroid, but it was quite absent from a large part of the lower half of the eye, the choroidal surface in that part being quite clean. It consisted of 1st, round cells, most of which were large and contained a nucleus of considerable size, and some of which were coloured of a brownish-yellow tint; 2nd, a comparatively small number of lymph-like corpuscles, about as large as white blood-cells; 3rd, much granular matter. The large coloured cells looked as if they were altered epithelial cells from the choroid. *The choroid.*—

The epithelium was complete in many sections, but in others it was wanting over spaces corresponding to several cells; the individual cells were ill defined and dim, as if from the presence between them of some granular matter. The inner surface of this layer was covered by the granular matrix of the subretinal effusion. The elastic lamina was normal. The chorio-capillaris was very unusually dim and granular from the presence apparently of fine molecules in its substance.

The *retina* was thickened in all parts, more or less, but especially so in the neighbourhood of the disc, and generally where the subretinal effusion was most abundant. The presence of several patches of detachment has already been noticed. The region of the yellow spot was markedly thickened, though less so than some other parts. A thin section including the optic disc and neighbouring retina was examined first entire, and then after parts of the nerve-fibre layer had been teased out. A considerable number of round, slightly granular corpuscles were found among the nerve-fibres; they were about as large as pus-corpuscles; they were quite free, as could often be proved where the nerve-fibres had been separated and had left these corpuscles in their interstices. The cells referred to were scattered, and were chiefly if not entirely confined to the inner strata of the nerve-fibres (nearest the vitreous). There were also rather large oval swellings noticed on some of the nerve-fibres.

Sections of the retina were made at various parts distant from the optic disc. In most of them the nerve-fibre layer contained a greater or less number of inflammatory corpuscles resembling those present at the optic disc. The layer of rods and cones was entirely absent from some specimens, and in none was it at all complete. The other layers varied in different sections; in some they were normal, in others the granule layers were ill-defined and the nerve-cells seemed scanty and far apart. In all the sections Müller's fibres were wanting in sharpness of definition, and appeared too thick. The appearances generally were suggestive of œdema accompanied by inflammatory effusion, the latter being confined to the innermost layer of the retina. The disturbance of the rods and cones was no doubt due to the material poured out from the inner surface of the choroid.

- *78. *Syphilitic Iritis of one Eye only, followed by disseminated Choroiditis, detachment of Retina and shrinking of Eye—Excision twenty months after primary disease—Microscopical examination of the Choroid—The Ophthalmitis associated with severe rupial rash—Patient salivated in early stage of disease.*

Sarah T., æt. 25, under the care of Mr. Hutchinson, and subsequently of Mr. Hulke. About twenty months before excision of her left eye, she had sores on the genitals followed by a rash and inflammation of the left eye. She attended at a hospital and was salivated on account of the eye. While taking the mercury her rash began to ulcerate and continued in a rupial condition for many months afterwards. She stated that never at any time was the right eye affected, and that the eruption had been much less severe on the right than the left side of the body. She was admitted under Mr. Hutchinson's care about ten months after the primary disease. She then had iritis of the left eye, and large ulcerating patches on the head and on one leg. She was cachectic and still salivated. She attended for more than two months, using strong atropine drops to the eye, black wash to the sores, and taking ten-grain doses of iodide of potassium (latterly increased to fifteen grains) three times daily. Her health improved; all signs of active inflammation of the eye disappeared, but the pupil was excluded; the ulcerations almost completely healed. She then ceased attendance for about seven months, and during this interval she had a miscarriage. At the end of that time she again came to the hospital complaining that the left eye had lately begun to pain her afresh. There was slight ciliary congestion and considerable diminution of tension. The lens was opaque. After continuing the same treatment as before for a few weeks without marked change in the symptoms, she became impatient, and applying on another day was admitted under Mr. Hulke's care and had the eye removed by him on August 19th, 1871.

Immediately after excision the globe was very soft, slightly shrunken, and somewhat squared. The *cornea* was clear. There was no anterior chamber. The pupil was blocked partly by uveal pigment, partly by white membrane. The eye was placed in a two per cent. solution of chromic acid for four hours in order to

harden the sclerotic, and then divided in the antero-posterior direction.

The *lens* was opaque, soft, and somewhat shrunken within its capsule. The *retina* was extensively detached and much shrunken, so as to form an almost solid column. It remained attached at the optic disc and ora serrata, and along a belt about .16 inch (4 mm.) wide passing between those two parts along the lower and inner part of the globe. Its outer surface was sprinkled with pigment spots. The subretinal space was filled by fluid which contained a great deal of cholestearine. The *choroid* was everywhere in apposition with the sclerotic. At the region of the yellow spot, and at the outer part of the equator, were two large patches from which the epithelium was almost entirely absent. They were of a whitish colour, and their borders were ill defined. These two patches almost joined each other. Situated on these whitish areas were a number of slightly raised white spots as large as split millet seeds. In other parts the epithelium was a good deal disturbed, being absent from some spots, but more frequently heaped up into little hillocks. Sections of the choroid were made from the whitened area near the yellow spot, and one of them included one of the little tubercles above mentioned. In these sections the epithelium was either totally absent or represented by a solitary cell here and there. The elastic lamina at this part was much wrinkled in some sections, but showed no other unusual appearance. The chorio-capillaris was in many parts thickened slightly, and in the section above-mentioned as including one of the tubercles this thickening was very considerable over a small area. (This area of increased thickening probably formed the tubercle; I say "probably," because no elevation of the elastic lamina was visible in the vertical section which showed the circumscribed thickening, a fact which may probably be accounted for by the pressure of the razor.) The thickening was very evidently due to the presence of pus-like corpuscles, of which there were several smaller and larger collections, the largest of course giving rise to the limited area of greatest thickening above mentioned. These cells had just the size of pus-cells and were faintly granular; where they were few in number they were generally noticed to be close to blood-vessels. There was no general infiltration of the choroid with these pus-like corpuscles; on the contrary they were entirely absent from a considerable part of

almost every section. The vessels, both of the chorio-capillaris and of the deeper layers, were full of blood and some of the larger ones distended. Another section was taken from a part where the epithelium was disturbed, but not extensively removed. In one of these two or three minute hillocks of epithelium were seen ("colloid" disease of the elastic lamina in an early stage). The largest consisted of about a dozen epithelial cells raised from the elastic lamina by transparent faintly granular matter; the cells preserved tolerably well their relative positions, and thus formed a sort of pavement over the minute lump of granular matter; their edges were, however, slightly separated from one another. The smallest hillock required only about three epithelial cells to cover it. These colloid bodies were numerous. In the same section at other parts small spaces occurred, from which several successive epithelial cells were absent, giving rise to minute pale dots when seen from the surface.

Besides the "colloid" bodies connected with the elastic lamina, a pathological result of another kind was found by Dr. Hermann Pagenstecher, who was kind enough to make a careful examination of this eye. Dr. Pagenstecher found that, besides the existence of the circumscribed inflammatory deposits above described, there was also a development of connective tissue in the form of minute pedunculated tumours upon the inner surface of the choroid. These tumours differed from the much smaller "colloid" bodies in being composed of distinctly nucleated fibrous tissue, the fibres of which formed a close network. They were not nearly so numerous as the "colloid" bodies. Some of them were situated directly over the deposits of lymph cells above described, and Dr. Pagenstecher thinks it probable, although he has not succeeded in demonstrating the fact, that a rupture of the elastic lamina took place through which inflammatory corpuscles might pass to the inner surface of the choroid. The narrowness of the foot stalk by which each little tumour is attached makes it very difficult to get a section exactly through its centre, and unless this can be done the (supposed) aperture in the elastic lamina cannot be seen.

RHEUMATIC INFLAMMATION OF THE EYE.

The following is an account of a very interesting specimen (No. 104), in which glaucoma followed chronic irido-cyclitis, in a decidedly arthritic patient. The iritis was of that well-characterised form in which the pupillary margin of the iris becomes everywhere firmly adherent to the lens-capsule, but its periphery, remaining free, gets bulged forwards by distention of the posterior chamber.

* 104. *Chronic Iritis excluding pupil twelve months before excision—Secondary Glaucoma—Complete blindness six months—Iris bulged forward—Ciliary congestion—Pupil nearly covered by Vascular Membrane—Chronic plastic Cyclitis—Chronic inflammation of Vitreous with formation of blood-vessels in it—Old peripheral Choroiditis and Retinitis—Optic Disc cupped—Patient arthritic—No evidence of Syphilis.*

William H., æt. 42, a coach-painter, under the care of Mr. Hutchinson. Admitted October 23, 1871. Twelve months before he came to the hospital both eyes were "blood-shot" for a short time. He had no pain. He applied leeches, and the right eye recovered perfectly, but the left gradually deteriorated and became quite blind six months after the attack began. Six weeks before admission the left eye began to fail gradually and without pain, as the right had done, but it did not again become congested, as it had at the first attack. When admitted the *left eye* was quite blind, T+. Its pupil was excluded completely; the iris (of a clear gray-blue colour) was bulged forwards, and was tremulous at its periphery. There was dusky ciliary congestion. In the *right eye* the pupil was also excluded; there was, however, only the slightest possible ciliary congestion, and he could with this eye just see 2 J. The left eye was excised. Iridectomy was performed in the right, with beneficial result.

The patient stated that he was "slightly rheumatic" in his knees, ankles, feet, and hands. On enquiry it appeared that two winters before he came to the hospital he had been laid up for a couple of months with pain and great swelling of his left foot, and that since that attack he had several times been obliged to leave

off work for a few hours on account of pain in various joints. His left foot remained rather weak. No lips were present on his femoral condyles. He knew of no family history of any arthritic complaints, though he was acquainted with most of his relatives. He showed no signs of inherited syphilis, nor did two of his brothers, who were afterwards seen. There was no history of any suspicious symptoms in any of the family. The patient himself, apparently very truthfully, denied ever having been exposed to the risk of contagion. He had been married for sixteen years. Six years before admission he had a fit in which he lost consciousness, and which was followed by prolonged imperfect left hemiplegia. Though he worked in paints containing lead, there was no history of any symptoms of lead poisoning.

The eye was placed in chromic acid for two days, and then divided transversely. The cornea was afterwards removed to show the iris.

The inner part of the *iris* was found to be closely adherent to the lens-capsule; the peripheral part was bulged forwards by fluid which separated it from the lens-capsule. After the ciliary attachment of the iris had been divided, the latter was found to be perfectly free until its pupillary border was approached, where over a narrow belt corresponding to the sphincter pupillæ, it was firmly united to the lens-capsule by tough white lymph. Considerable force had to be employed to separate this part of the iris from the lens. The posterior surface of the iris, with the exception of the inner circle, was perfectly healthy, and covered by a uniform layer of uveal pigment. On examining the pupillary area after the iris had been quite separated from all its attachments, a thin membrane was found stretching across it. It was incomplete at one part, an oval aperture extending from one part of the pupillary edge about half way across the pupil. That part of the pupillary edge of the iris to which the membrane was attached (forming about $\frac{7}{8}$ of the entire circumference) was thinned, and its tissue spread out somewhat, as if contraction of the radial fibres of the iris had occurred before this part was quite firmly fastened to the lens-capsule. The edge of the remaining $\frac{1}{8}$ of the pupil, from which no membrane passed to the pupillary area, was normal. The membrane itself, when magnified 160 diameters, was seen to be composed of connective tissue, with numerous branching corpuscles, and a considerable number

of blood-vessels. The blood-vessels formed a coarse meshwork which reached across about $\frac{1}{3}$ of the width of the pupil; they were all of small size, and none contained more than a single row of blood-corpuscles, and many were quite empty; none of them showed any muscular coat. They were continuous with larger vessels at the pupillary edge of the iris. .

The *lens* was opaque, and in its normal position. The *retina* was opaque from the action of chromic acid, and *in situ* everywhere; it presented no signs of disease to the naked eye; its large vessels were very full of blood. The *optic disc* was deeply and evenly cupped. The *retina* was examined microscopically at its front part. At about .2 inch (5 mm.) from the ora serrata it was apparently quite normal in all respects when magnified 450 diameters. Sections taken nearer the ora serrata (.1 inch = 2.5 mm. from that line) showed changes in the bacillary layer, while here and there small masses, or isolated granules, of dark brown choroidal pigment could be seen in various parts of the retina, chiefly, but not exclusively among the elements of its outer layers. The rods and cones in the part mentioned had lost their regularity of shape and uniformity of position. They were placed at various angles with the limiting membrane, and were often bent, and their choroidal ends enlarged, or otherwise altered in form; in number, too, they were very deficient, so that there were many empty spaces more or less circular in form, and wide enough to contain two or more rods, between the choroid and outer limiting membrane of the retina. No changes were observed in the inner layers of the retina excepting quite close to the ora serrata, where many sections showed the condition called "cedema" of the retina in a very marked degree. This condition is brought about by hypertrophy of the vertical connective-tissue pillars, and atrophy of the nerve and granule layers; so that spaces of considerable size are left between the overgrown fibres of Müller, while the retina is at the same time much thickened by the hypertrophic lengthening of those fibres.

The *choroid* was examined with the overlying retina in vertical sections .2 inch (5 mm.) from the ora serrata, and further forwards. No changes were observed in those parts where the corresponding retina was healthy; but where the bacillary layer of the retina had undergone the changes already described, the superjacent choroid showed evidences of epithelial disturbance.

The hexagonal cells of these parts had more or less lost their outlines; here and there two or three cells were piled upon one another, whilst now and then several cells were altogether wanting. The commencing pigmentation of the retina in these parts was doubtless due to colouring matter derived from the choroidal epithelium. The deeper layers of the choroid showed no noticeable alterations.

The *vitreous* was opaque, tough, and stringy. The hyaloid separated with unusual ease from the retina until the ora serrata was reached, and there it became more adherent than is commonly the case. Near to the ora serrata, and attached to it firmly, the vitreous contained numerous densely white, tough threads and bands; this change was most marked over about $\frac{2}{3}$ of the circumference of the globe.

The *ciliary processes* over $\frac{2}{3}$ of the ciliary area were shrunk, and their apices $\cdot 062$ inch (1.6 mm.) from the margin of the lens; this alteration was most developed in the part corresponding to the opaque and fibrous vitreous.

Microscopical Examination of the parts in the Ciliary Region.—Portions of hyaloid and vitreous stripped off from the ciliary retina and ora serrata contained a considerable number of large cells, either round or caudate, mostly with one, sometimes with two or more, nuclei. Some of the tough, white bands which passed from the ora serrata into the vitreous humour consisted of bundles of well-formed fibrous tissue which sometimes contained blood-vessels. Vertical sections through all the tunics showed abundant evidences of chronic and still progressing inflammatory changes beginning in the inner layers of the ciliary muscle. These changes had advanced furthest at a point about midway between the ora serrata and ciliary processes. At this head-centre of inflammation the inner layers of the ciliary muscle were crowded with lymph corpuscles, most of them round, but not a few of various shapes, indicative of commencement development into connective tissue; in some parts there was also a considerable matrix of reticulated fibrous tissue between the lymph corpuscles. The pigmented epithelial layer covering this part of the ciliary body was protruded somewhat towards the vitreous by the swelling of the superjacent muscular and fibrous layer; and its line was moreover much broken and its cells widely separated from one another, by crowds of lymph-corpuscles, which, continuous on the

one side with those already described in the ciliary muscle, passed on the other into a similar collection quite on the inner (vitreous) surface of the ciliary epithelium. The ciliary retina was slightly detached by this accumulation of inflammatory products, and it was abundantly infiltrated by them, as were also the corresponding suspensory ligament and hyaloid. In front of and behind this centre of inflammation, the lymph corpuscles became gradually less numerous, and close to the ora serrata there were few if any of them in the ciliary retina, and only a fair sprinkling of them in the suspensory ligament and hyaloid. The great majority of these cells were round, and about as large as pus-corpuscles. In some sections, however, those of them between the ciliary retina and the uveal epithelium, at some little distance from the inflammatory centre, had undergone changes into various forms of stellate and branched cells, whose processes were in contact with pigmented epithelium on one side, and ciliary retina on the other. In the hyaloid, also, the great majority of the cells were much larger than pus-corpuscles, and contained large nuclei. It has been already mentioned that blood-vessels were seen in some of the fibrous bands which passed from the ora serrata into the vitreous. I hoped to obtain abundant evidence in vertical sections of vessels passing in the vitreous, but I succeeded only very imperfectly. In only two vertical sections could any vessel be seen in front of the ora serrata. In one of these a small vessel containing a single row of blood-corpuscles made its appearance in the connective tissue of the retina at the ora serrata, and passed from thence forwards for a very short distance into the fibrous membrane on the inner surface of the ciliary retina (the commencement of the suspensory ligament); there it was lost. In the other section a very short piece of a small vessel containing blood-corpuscles was seen in the suspensory ligament just in front of the ora serrata, but it could not be traced backwards to the retina at the ora serrata, nor inwards into the vitreous.

EYES LOST BY SIMPLE GLAUCOMA.

- *75. *Perforating Ulcer of Cornea in an old Glaucomatous Eye—Hæmorrhage between Choroid and Sclerotic—Retina detached, &c.*

Anne B., æt. 47, under the care of Mr. Critchett. She had been under care at various times for more than four years, and had been treated for glaucoma of each eye at different dates. In August, 1871, she again came with a sloughing ulcer, which had perforated the centre of the right cornea. The globe burst at the corneal perforation during excision. It was afterwards hardened in spirit and water, to which some bichloride of mercury had been added, and then divided vertically from behind forwards.

There was no lens. The cornea showed a large hole at the centre, which was partly filled by a plug of semitransparent vitreous. The *retina* was detached in numerous folds, remaining attached at the optic disc and ora serrata. The *vitreous space* was thus much diminished. The vitreous and the retina were both blood-stained. The choroid was detached from the sclerotic by a thick layer of blood everywhere, excepting at the lower and back part of the fundus, where it was still in contact with the sclerotic. The blood extended in front as far as the attachment of the iris and ciliary body to the sclerotic. Part of this eye is preserved in the museum of the London Hospital Medical College.

105. *Inflammatory attack with Ulcer of Cornea in an Eye Blind for three years from neglected Glaucoma—Lens slightly Shrunk—Optic Disc Cupped.*

William P., æt. 32, under the care of Mr. Couper. Thirteen years before excision he had an attack in the right eye, during which the sight became "foggy." It lasted five weeks, and he believed that the sight became as good as ever again. He was under treatment at an Ophthalmic Hospital, but had no operation performed. Four years before excision the same eye gradually failed. The attack was described as similar to the earlier one, but instead of passing off it got worse, and in twelve months the eye had become quite blind.

He came under care in September, 1871, for an ulcer of the right cornea, three years after the eye had become blind. The ulcer granulated and became vascular. The eye was very hard ($T + 2$), and remained for several weeks painful and much congested. It was excised on October 31. The other (left) eye was perfect, and had never at any time been defective.

The right eye was placed for 24 hours in chromic acid, and then divided into halves. The *pupil* was round and quite free, but eccentric. The *lens* was perhaps slightly shrunken, its margin being further than usual from the apices of the ciliary processes. The *vitreous* contained several recent hæmorrhages of small or moderate size, situated near the hyaloid in front of the ora serrata. They very probably occurred during the operation of excision. The optic disc was very deeply cupped. There were no naked eye appearances of any other disease, excepting the granulation mass at the lower margin of the cornea, on the seat of the former ulcer.

MYOPIA.

*59. *Spontaneous Inflammation of a Myopic Eye—Sight lost in two weeks—Excision four months after beginning of attack—Extensive Subretinal Hæmorrhage—Retina detached and shrunken—General enlargement of Globe—Posterior Staphyloma.*

George R., a farm labourer, 65 years old, under the care of Mr. Wordsworth.

His left eye had always been "short-sighted;" he could see near objects well with it, but not those which were far off. Four months before excision this eye inflamed, as he believed after exposure to cold. The eye was very painful. He believed that all sight was lost in about two weeks. He stated that attacks of pain had continued to trouble him at intervals of a few days, ever since the eye failed, and that the pain in the eye had always been accompanied by pain and "soreness" in the head. There was no history of syphilis, or of rheumatism.

Condition at date of Excision.—He was a robust, healthy-looking man. His left eye was quite blind, and diverged (he believed that it had always "turned out"). There was considerable congestion of sclerotic and conjunctiva. A small cyst

was present at the edge of the cornea. The cornea was clear. Anterior chamber shallow, pupil wide, irregularly round, fixed, and displaced upwards; there were spots of uveal pigment adhering to the lens-capsule. The iris was dull greenish in colour. The lens was opaque. Globe excessively tender, so that he would scarcely allow of pressure with the finger tips; T perhaps normal, but it could not be accurately tested. The other (right) eye was perfect, but irritable; its iris was blue.

The globe was placed in Müller's solution for a fortnight.

The eye was slightly enlarged in all directions. From the centre of the cornea to the position of the yellow spot (outside the eyeball) measured 1.15 inches (28.75 mm.); the transverse diameter at the equator was 1.15 inches (28.75 mm.); the vertical diameter at the same part was 1.075 inches (26.87 mm.). There was noticeable bulging of the sclerotic at the region of the yellow spot, and between the superior and external recti.

The *retina* was detached and shrunken into a firm pillar, attached by its narrow end to the optic disc, and by its expanded foot to the ora serrata; there was no vitreous space. The sub-retinal space was full of blood, partly clotted, but for the most part forming a chocolate-brown fluid. The red corpuscles were well preserved, both in the clot and the red-brown fluid; their outlines were circular. In the fluid there was, besides blood corpuscles, much fine brownish molecular matter. In the clot there were, in addition to the red blood discs, a good many large granule cells, each containing a nucleus as large as a red blood corpuscle. The nuclei of many of these cells were highly pigmented, and of a dark brown colour, the rest of the cell substance in such cases having a much lighter shade of the same colour. The *choroid* looked thin in all parts. Its epithelial cells were round, most of them enlarged, and many of them contained several nuclei. In the elastic lamina there were numerous very beautiful blood-crystals, needle-shaped or thorn-shaped, and grouped in bundles or stellate figures. The elastic lamina in some parts could be readily peeled off from the subjacent choriocapillaris. The choroidal stroma in the parts examined was totally devoid of pigment, and was composed almost wholly of straight fibres having definite outlines, and running for the most part parallel to each other. There was a posterior staphyloma of the sclerotic and choroid nearly surrounding the optic disc;

it formed three-fourths of a circle, the lowest fourth being deficient. This staphylomatous crescent was widest at the outer side of the disc. Its margin was well defined everywhere, although least so at its widest part, that towards the yellow spot. The distance between the centre of the optic disc and the outer (yellow spot) margin of the crescent was not quite $\cdot 1$ inch (2.5 mm.).

INTRA-OCULAR TUMOURS.

*94. *Melanotic Sarcoma of Ciliary body and Choroid producing at early period Secondary Deposits on outer surface of Sclerotic without thinning or perforation—Gradual failure of Sight for about ten months; some Sight remaining at time of excision—Never any Inflammatory Symptoms—Ophthalmoscopic Diagnosis of Intra-ocular Tumour and partially detached Retina—Microscopical demonstration of passage of Pigment Cells along Blood-vessels through Sclerotic.*

John Moules, æt. 62, Stevenage, Hertfordshire, a farm labourer, admitted under the care of Mr. Wordsworth, on September 30, 1871. Notes taken on admission:—"He noticed nothing amiss with the left eye until about December, 1870, when he saw that there was a black speck on the outer part of the white of the eye. He does not know at all accurately when the sight of this eye began to fail, but seems to think that it had failed partly before he noticed the black speck. The sight continued to get worse, but at Easter time (in April), 1871, he still had fairly good sight with this eye. He has never had any pain or redness of the eye. He has almost black hair, and swarthy complexion. He knows of no family history of tumours. *Present condition*:—Left eye can see a light held at the temporal side. Pupil rather dilated, fixed; iris not discoloured. No congestion of any part of the eye; no pain. Tension rather diminished. On the sclerotic, near to the outer margin of the cornea, there are several black patches; they are slightly raised above the level of the surrounding sclerotic, but the conjunctiva is not perceptibly stretched by them, and it is perfectly movable over them. They are four or five in number. Two are much larger than the rest, being about $\cdot 1$ inch (2.5 mm.) in diameter, while the others are mere specks. There is no alteration in the shape of the globe, nor any exophthalmos. *Ophthalmoscopic examination*:—The

normal choroidal reflex can be obtained only at the inner and upper part of the fundus (erect image). The retina is detached slightly at the lower and inner part, but not so much as altogether to prevent transmission of light to the choroid. The whole of the outer part of the field gives a perfectly black reflex, which ends near the vertical middle line by a sharply defined edge."

The eye was excised on the day of admission, and placed for five days in chromic acid. Its transverse diameter outside the sclerotic was 1·05 inch (26·5 mm.); its vertical diameter, in the same relation to the sclerotic, 1 inch (25·3 mm.). The globe was divided in the antero-posterior direction from above, downwards and outwards.

The *retina* was *in situ* at the inner and upper part. It was detached in folds at the lower as well as at the upper and outer parts of the eye. The greater part of the outer half of the eye was occupied by a uniformly black tumour, which was attached to the choroid and pushed the retina before it. Its base, at about the middle, where it was divided, measured ·55 inch (13·9 mm.), and extended from close to the ciliary processes in front to a short distance behind the equator. Its thickness, measured from the middle of its base to its most prominent point, was ·65 inch (16·25 mm.), and reached about to the level of the optic disc. The retina covered only its most prominent part, and was in that place more or less thinned and adherent to the tumour. The tumour projected inwards and somewhat backwards. The greater part of its surface was pretty evenly rounded, and there was a slight constriction near its base giving it a somewhat fungiform shape. It was not in contact with the choroid anywhere, excepting by its base. It was nowhere nearer to the lens than ·05 inch (1·25 mm.). The largest of the black patches beneath the conjunctiva was opposite the centre of the base of the tumour; the greatest thickness of this patch was about ·02 inch (·5 mm.). The other parts of the eye appeared normal. The intra-ocular tumour was found to consist of cells, most of which were pigmented, although there were considerable numbers devoid of pigment. The majority of them were spindle-shaped, but all forms were represented, from the typical spindle-cell to the sphere. All the cell-forms showed some examples pigmented and others without any pigment. Careful naked eye examination failed to detect any discoloration or thinning of the sclerotic which separated the intra-ocular

tumour from the largest of the subconjunctival black patches (only the largest of the patches was specially examined as to this feature). A number of thin sections were made, including the whole thickness of the subconjunctival growth, and of the sclerotic, together with part of the subjacent intra-ocular tumour.

When these sections were examined with a magnifying power of 30 diameters, a number of pigmented lines were found in the sclerotic between the two growths. They ran in various directions, the majority however having a course parallel with the scleral fibrous tissue. The lines frequently gave off branches at right angles, or nearly so, the branches being generally smaller than the stems from which they proceeded. They occurred in all parts of the sclerotic between its inner and outer surface, and one of them communicated directly with or appeared to take its origin from the melanotic mass in the choroid. This one is shown in the accompanying figure (fig. 1). It will, however, be seen from the wood-cut, that these pigmented lines were more numerous in the outer than in the inner layers of the sclerotic, and in the subconjunctival tissue in front of the extra-ocular growth they became very numerous. In none of the sections could any single line of pigment be traced completely through the sclerotic. It will be observed in the specimen from which the figure was taken (and this was the case in all the sections), that these dark lines were most abundant in a part somewhat in front of the extra-ocular growth, and that the sclerotic between the thickest part of that growth and the intraocular tumour was comparatively free from them. From the size, relative number in the outer and inner parts of the section, and manner of branching of these pigmented lines, there seemed to be no doubt that they were the normal blood-vessels of the part surrounded



Fig. 1. Section through the extra-ocular growth, conjunctiva, sclerotic, and part of the intraocular tumour, showing the pigmented lines (blood-vessels) in the sclerotic between the primary and secondary tumours. $\times 15$.

by pigment; and this conclusion was borne out by their appearance under higher magnifying powers.

When magnified 250 diameters and upwards, the pigment was found to consist of small masses of dark-brown colour. They varied a good deal both in size and shape, many being round, others elongated and more or less spindle-shaped; most of the round ones were somewhat larger than red blood-corpuscles.

Pigmented lines, which with a low magnifying power appeared single and uniformly dark, were found, when highly magnified, to consist in many parts more or less distinctly of two lines, the interval between which was comparatively free from pigment, and was formed by the cavity of the vessel. In two or three cases the pigment gradually thinned off and allowed the cavity of the vessel containing well-preserved blood-corpuscles to be seen. There was in many cases a more or less definite appearance of a fibrous structure between the pigment cells and running parallel with the course of the vessels; this was no doubt due to the longitudinal coat of the latter. Many of the small pigmented vessels were cut transversely or obliquely across, but the mass of pigment around them was generally so thick as to obscure the cavity of the vessels. Beneath the centre of the extra-ocular growth, and close to the outer surface of the sclerotic, was a large vessel (probably an artery) which was cut across in most of the sections, and in whose coats a number of pigment cells were found (fig. 2).

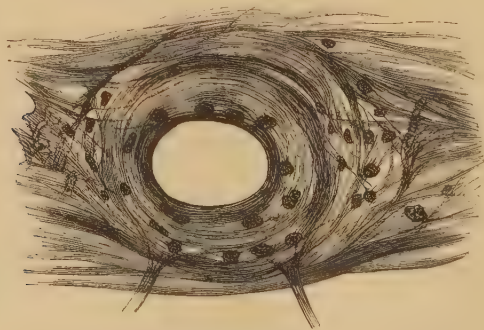


Fig. 2. Transverse section of the vessel which ran beneath the centre of the extra-ocular tumour, showing pigment cells in its coats. $\times 250$.

This vessel communicated with another large one which ran forwards from it at right angles, and lay also in the extreme outer layer of the sclerotic, if not in the loose subconjunctival tissue; this vessel is seen in fig. 1. For a considerable distance it shows no pigment, but as it passes forwards it becomes gradually darkened, and in front communicates with several highly pigmented vessels. It seems probable that the exact location of the extra-ocular growth was, to some extent at least, determined by the position of the large pigmented vessel (fig. 2) on the surface of the sclerotic. There can be no reasonable doubt that this vessel had pigmented branches which communicated indirectly with the smaller pigmented vessels in the deeper layers of the sclerotic, and that the pigmented cells in its sheath may have been derived from these, although the only considerable branch which was actually seen to be given off from it was in great part free from pigment cells. It is, however, to be observed that the subconjunctival tissue for some distance in front of the extra-ocular growth contained numerous highly pigmented vessels which communicated directly with many of those in the sclerotic, and that this pigmented subconjunctival network was continuous with the front border of the growth (its hinder border did not communicate with pigmented vessels, but was quite sharply defined). It is, therefore, quite possible that while the growth and multiplication of the melanotic cells so as to form the extra-ocular mass was influenced by the presence of a copious blood-supply from the vessel (fig. 2) beneath them, still, the actual carriage of the earliest infecting cells or nuclei may have been effected by some of the subconjunctival vessels just mentioned.

*66. *Melanotic Sarcoma of Choroid; perforation of Sclerotic, and large extra-ocular growth—Retina detached—Eye becoming Blind (after parturition) four years before excision—Commencement of pain, &c., two years later—Enlargement of Eye noticed twelve months—No recurrence five months after operation—History of Cancer in a Sister; and of loss of one Eye (without injury) in Father and two Sisters.*

Martha Garrard, æt. 38, living at 4, Marian Place, Pritchett's Road, Hackney Road, London; under the care of Mr. Critchett. The following notes were taken at the time of her admission,

August 4, 1871 :—" She is a thin woman, and has been losing flesh for about twelve months. She is still suckling her youngest child now aged sixteen months. Four years ago, while lying in with her sixth child, her left eye became blind : it was not painful at that time, nor until two years later, when she began to suffer from severe shooting pain around the eye and in the same side of the head (and perhaps in the eyeball itself, but this is not certain from her account). About twelve months ago, soon after her last confinement, she first noticed that the eye was beginning to enlarge ; she has had occasional pain since the enlargement began, but it has been of a less severe character than formerly."

"Present Condition.—The left eye looks enlarged. The enlargement is due to a considerable lobulated black mass which forms a protrusion at the upper and inner part of the globe. The sclerotic covers the growth everywhere, but is very much thinned and looks as if on the point of giving way. Conjunctival veins very large and tortuous. Cornea hazy. Anterior chamber shallow. Pupil fixed. Lens opaque."

"Family History.—One of the patient's sisters died at the age of 40 years of 'tumours in the breast, which went all over her, and formed a lot of hard lumps.' The same sister, a short time before her death, lost one of her eyes ; the patient states that it became blind spontaneously and afterwards shrunk up. Another sister, a twin to the patient, has also lost an eye ; it is her right eye, and is stated to have been lost very shortly after a confinement ; it is said to have become smaller than it was. Lastly, the patient's father lost his left eye by some 'inflammation ;' the patient states that it had not been injured, and that it also shrunk up."

The eyeball was excised on the day of admission. The tumour had perforated the sclerotic at the back of the eye to the inner side of the optic nerve, and a large portion of the growth was thus extra-ocular. This portion was removed partly in company with the globe, and partly afterwards by scissors.

The eye was hardened in chromic acid, and then divided nearly vertically from behind forwards. The upper part of the globe was occupied by a large somewhat spherical pigmented tumour, which sprung by a very broad base from the choroid, to which it was attached from a point just above the optic disc as far forward as the ora serrata.

It had grown chiefly downwards into the globe, but partly upwards also, so as to cause a considerable increase of the vertical diameter of the eyeball, which measured 1·075 inch (27·42 mm.). The greatest vertical thickness of the tumour was about ·75 inch (18·75 mm.). The lowest part of its inner surface was level with the lower margin of the lens, and about ·5 inch (12·65 mm.) behind it. The hindmost part of the free surface of the tumour was in close contact with the optic disc, from which it had detached the retina. Its cut surface was unequally pigmented; the parts nearest to the choroid were for the most part almost black, the thickest mass of highly pigmented tissue being close to the base of the extra-ocular growth. Towards the centre of the mass there was a large and tolerably well-defined portion of pale brown or buff colour. All the rest of the tumour was of a mottled brown, intermediate in depth of tint between the above extremes.

The sclerotic covering the outer surface of the tumour was extremely thin, and indeed was altogether invisible to the naked eye for a short distance at the hindmost part of the globe. Outside the eyeball, and springing from or through the most attenuated part of the sclerotic, was a large extra-ocular growth, the whole of which together was about as large as a filbert. The greater part of it was lightish gray in colour, and contrasted strongly with the dark tumour within the eye. The apparent perforation of the sclerotic above-mentioned was at the middle of the base of this extra-ocular tumour. The *retina* covered and adhered to the inner surface of the intra-ocular growth; it was detached in folds from the greater part of the remaining choroid. The *vitreous* was shreddy, tough, and semi-opaque. The lens was opaque in the centre, of normal size, and not displaced. The *anterior chamber* (contrary to the observation made during life), was quite of normal depth, neither iris nor lens being pushed forward in the least. The primary (intra-ocular) tumour consisted of pigmented spindle-shaped cells, among which were some having several processes like the stellate cells of the choroidal stroma. The structure of the extra-ocular growth was much the same; the cells of which it was composed however contained less pigment, and had shorter processes, many of them indeed being oval or round.

This patient was seen again on January 19, 1872 (five months

after the operation). There was then a mass of healthy-looking granulations, as large as a pea, springing from the centre of the conjunctival scar; it was not hard, nor was it in the least pigmented. No spots of pigmented tissue could be seen in any part of the conjunctiva. She was pregnant.

Besides the specimens marked * in the above Report as added to the Pathological Collection of the Museum, a number of injected preparations of the structures of the healthy eye and orbit have been made. They form two series.

SERIES I.—*Transparent Injections (for the microscope) of the structures of the Human Eye and Orbital Tissues.*

1. The conjunctiva of the eyelid. Arterial injection.
2. The same. Arteries red, veins blue.
3. The vascular supply to the meibomian follicles, seen from the inner surface after dissecting off the conjunctiva. Arterial.
4. Sections through the upper lid, showing all the structures from conjunctiva to skin. Arterial.
5. The capillary network at the edge of the cornea. Arterial.
6. A part of Schlemm's canal. Venous.
7. The lacrymal gland. Arterial.
8. The same, mounted in Canada balsam.
9. Part of the muscular tissue of one of the recti at its junction with its tendon. Arterial.
10. The whole iris. Arterial. The pigment at the back of the iris removed. This preparation shows well the long radiating arteries in the outer ring, and the network of capillaries in the sphincter pupillæ which constitute the lesser vascular circle.
11. Section through the sclerotic, cornea, ciliary body, and iris. Arterial. The pigment partly removed from the ciliary body.
12. The same. Arteries red, veins blue.
13. Arteries and capillaries of the ciliary body.
14. Part of choroid (front part), ciliary body and iris showing the arteries and capillaries of the two first and the long vessels of the iris. Arterial. The epithelium removed.
15. Part of choroid and ciliary body. Arteries red, veins

blue. The epithelium removed; showing the arteries, capillaries, and *venæ vorticosæ* of the choroid, the veins and capillaries of the ciliary body, and the long arteries of the iris.

16. The choroid near the optic disc. The epithelium removed. Arterial.

17. The same. Arteries red, veins blue.

18. The retina at and around the yellow spot. Arterial. Viewed from the inner surface. The injection has filled all the capillaries and in many cases has passed on into the veins. The yellow spot itself is quite devoid of vessels the capillaries forming a series of loops around and close to it.

19. A piece of the same retina from another part of the fundus.

20. A piece of the same retina near to the ora serrata. The capillary network here has much larger meshes than at the back of the eye. None of the retinal vessels pass beyond the ora serrata; all form loops, close to that line, which return to the retina.

21. Vertical section of the same retina to show the position of the vessels in the inner layers.

22. The optic nerve, transverse and longitudinal sections. Arterial.

SERIES II.

1. The hyaloid artery and its branches in a kitten 1 *hour after birth*.

2. The same at 36 *hours*.

3. The same in a puppy at 4 *days*.

4. The same at 10 *days*.

5. The same at 16 *days*.

These specimens illustrate well the rapid decrease in the supply of blood to the lens-capsule, &c., after birth in animals born with coherent eyelids. This blood supply does not cease until several days after the eyelids separate from one another. The separation begins to take place about the 9th day, while some blood is still carried to the back of the lens as late as the 16th day, although at that date all branches of the hyaloid artery have become obliterated and only the central trunk remains; as late as the 10th day, however, there are still a considerable number of branches.

PART II.

A Periscope

OF

CONTEMPORARY OPHTHALMIC LITERATURE.

FORMATION OF BONE IN THE EYE.

H. KNAPP writes an able paper on this subject in the "Archives of Ophthalmology and Otology," 1871, p. 1-35. He first of all asks what membranes and which layer of each are the starting points of ossification? It remains doubtful whether true bone has ever been shown to have developed in the vitreous or the lens. It is incontestable that formation of connective tissue within the lens may take place. Since connective tissue is capable of ossifying wherever it exists, it may do so in the lens. Petrification is a process of regressive metamorphosis, and therefore not infrequent in old cataracts, especially those of a degenerative kind. Ossification, on the contrary, is an active process, requiring a good supply of nutritive material, for which the crystalline lens offers very unfavourable conditions, possessing, in its normal state, no blood-vessels. The retina and vitreous body are not very apt either to become the origin of ossification, the latter having no vessels of its own and the former also being but scantily supplied with blood. The uveal tract is the only coat in the eye which can furnish abundant supply of nutritive material to any new formation. The capillary layer is the principal source of nutrition, and ossification seems to originate always either in it or in inflammatory products derived from it.

Five cases are given in considerable detail, and an account of the microscopic examination in each case. Two other specimens are mentioned, but when examined were in a damaged condition. In the first case the patient was a girl aged 17. The left eye had always been liable to inflammation from early childhood. The other eye remained good. The two posterior thirds of the eyeball, as far as they could be brought to view, were to the touch as hard as wood; while the anterior third, that is the cornea and adjacent parts, were of normal consistence. The ossi-

fication was found to be limited to the capillary layer of the choroid. In the three following cases the eye had been injured years previously and sympathetic ophthalmia had resulted in the other. The patients were adult males. In the fifth case the patient was a woman, and had suffered from iritis, &c., during a period of 19 years. The other eye had become inflamed.

The author sums up to the effect that when the process is still in a low stage of development the ossification takes place in small plates which lie in the chorio-capillaris, and are covered by the hyaline membrane and the epithelium of the choroid. If the morbid action be further advanced the more abundant exudation wrinkles, and perforates the hyaline membrane, invests the inner surface of the choroid, and is gradually converted into osteoid tissue. The retina remains sometimes in immediate contact with the inner surface of the osseous capsule, but it is generally separated from it, retaining, however, its attachments to the ora serrata and the optic disc, perforating the bone shell in the latter place. The abrupt termination of the osseous capsule of the ora serrata made Prof. Knapp think that the chorio-capillaris played an essential part in the production of the ossific deposit. The continuation of the ossifying connective tissue coat, covering the inner surface of the bone capsule into a false membrane stretching like a septum from the ora serrata transversely through the vitreous body, serves to bring the occurrence of osseous layers in this region into connection with the chorio-capillaris. The bone production did not originate in the ciliary processes in either of the specimens. "Formation of bone in the eye is the consequence and final stage of a plastic inflammation of the capillary layer of the choroid. It invests the inner surface of the choroid and continues in the form of a transverse septum, through the anterior part of the vitreous humour, behind the ciliary body and crystalline lens, without, however, involving these structures. The diseases which led to ossification are chronic inflammations of the interior coats of the eye, called internal ophthalmia by the older, irido-choroiditis by modern writers. It should be particularly mentioned that chronic plastic inflammation limited to the ciliary body and iris (irido-cyclitis), which is not uncommon and leads to the formation of false membranes before and behind the lens, has not been found to generate osseous tissue. Nor has ossification been demonstrated as a sequel of iritis alone. The diagnosis of ossification may be based upon the unyielding and hard condition of the posterior part of the globe, terminating about two lines behind the cornea, while the interior region is soft, or at least impressible. Simultaneous occurrence of calcification and ossification is frequent. Calcification may be diagnosed by atrophy or degeneration of the iris, in combination with a shrunken white or yellowish cataractous lens. As ossification does not involve the outer choroidal layers, nor the ciliary muscle

and iris, it, in itself, is not to be dreaded as a cause of sympathetic ophthalmia. The latter only resulting from iridio-cyclitis supervening as a complication to ossific choroiditis. As long as an eye in which ossification is diagnosed remains free from irritation, and its fellow also, the removal of the former, for fear of sympathetic inflammation, is not indicated. To corroborate this, I may state that I have not infrequently observed cases in which eyes bearing the signs of ossification, and even being tender to the touch, in the ciliary region were tolerated without annoyance for 20, 30, and 40 years."

PHLEBITIC OPHTHALMITIS.

Dr. Warlomont relates the following case:—

The patient was a veterinary surgeon, 53 years of age, of a robust constitution and habitually in good health. A week previously he had observed a boil above and to the inner side of the left eyebrow, just above the root of the nose. He pinched and irritated it causing it to inflame, and in three days an erysipelatous blush appeared and spread over the greater part of the face; the eyelids became œdematous, the skin of the nose became more shining than that of other parts, and the conjunctiva became slightly congested. He did not shiver. The boil was incised. The pulse was slightly quickened. On the seventh day the erysipelas began to subside. The next day throbbing pain was complained of in the left eye. The conjunctiva was slightly œdematous, the cornea was clear and vision intact. He had shivered slightly several times, when his bowels were acted on after the administration of a purge. On the evening of the same day the symptoms as regards the left eye had become more marked, the upper eyelid was more swollen and pushed forwards. The eyeball moved less freely and was somewhat pushed forwards. Some of the veins of the forehead were prominent and their course could easily be traced both with the eye and with the finger. On the ninth day both eyelids, especially the upper one, were reddened, shining, and pushed forwards by projection of the eyeball. A portion of œdematous conjunctiva, covered with sero-purulent fluid, bulged between the eyelids. The cornea was with difficulty exposed, but was quite transparent; the pupil was widely dilated and sight was quite lost. No fluctuation could be made out around the globe. There was no suspicion that the patient had inoculated himself with any poisonous material. The diagnosis which was made was that of phlebitis of the orbit and eyeball. Ophthalmitis, if not traumatic, is always dependent on some specific cause, generally purulent infection. In this case such a cause was not far to seek in the phlebitis of the veins emerging from the boil in a state of suppuration. On the tenth day the cornea had lost its transparency, the pupil was cloudy, the intra-

ocular tension was increased, and the iris pushed forwards. Evidently the interior of the globe was becoming affected, and probably there was effusion between the retina and choroid. The patient in the course of the day passed into a state of profuse perspiration, but had no fever and very little pain. On the eleventh day the patient was somewhat delirious. The right eye had also become slightly affected. He became comatose at midday and died in the evening. There was no post-mortem examination.—(*Annales d'Oculistique*, November—December, 1871, p. 229.)

AN OPHTHALMOSCOPE TO BE USED BY TWO OBSERVERS.

Dr. A. Sichel (fils) has devised an ophthalmoscope for use in demonstrations, &c., to enable a second observer to see with greater distinctness than is obtainable by others invented for the same purpose. A prism is placed behind the perforation in an ophthalmoscopic mirror in such a way that a part of the aperture is left uncovered by it. A portion of the rays falling on the perforation pass through to the eye of the primary observer behind, whilst the greater portion of the rays are refracted to one side of the prism, and can there be made use of by a second observer, who obtains a very distinct image. The whole apparatus packs in a small compass, and is held by a handle in one hand. It can also be fixed on to a table if desirable. Figures are given.—(*Annales d'Oculistique*, January—February, 1872, p. 57.)

A HANDY PRISMATIC COMBINATION.

M. Crêtès, optician in Paris, has devised a prismatic arrangement by which he obtains the advantage of a whole set in a small compass. He makes use of the fact that if you place two prisms together, with their bases over each other, and their apices coinciding, you obtain double the refractive power, whereas if you try the converse you neutralise the prisms altogether. Between these two extremes a great variety of refractive powers may be obtained. Two prisms are placed in a little circular box mounted on a handle. On the stem of the handle is a button, which moves up and down, and rotates the prisms on one another. An index at the side shows the index of the refraction obtained in any position of the button.—(*Annales d'Oculistique*, January—February, 1872, p. 62.)

TREATMENT OF WOUNDS OF THE EYE BY SUTURE.

Mr. Thomas Windsor narrates a case in which he made use of a suture with great advantage in the treatment of a wound of

the ciliary region. The patient was a delicate looking lad, whose eye had been wounded by a large knife. There was an incised wound commencing in the upper and inner side of the cornea, and extending in the sclera backwards for fully half an inch; there was a nodule of prolapsed iris in the anterior part; the rest of the wound was gaping widely, and through it the vitreous was bulging, though none appeared to escape. The question of a suture at once arose. It appeared however inadvisable to give chloroform, because the child was certain to cry and struggle, and the least effort would probably force a quantity of vitreous through so large a wound. A bandage was applied. In a fortnight, the progress being slow, the nodule of prolapsed iris was removed. At the end of three months the centre of the wound still remained open, allowing of projection of the vitreous. A bandage was applied more tightly, but without effect. A month later chloroform was administered, the projecting nodule of vitreous was snipped off, and a suture applied through the middle of the wound. The stitch completely closed the wound. In four or five days the suture separated spontaneously, and the wound was firmly closed at the end of a fortnight. At the end of two months it is noted "wound appears firmly healed; pupil of good size, but a little displaced inwards, with a rather large coloboma extending to the margin at the inner and upper side; it reacts moderately to light. He reads slowly No. 5, and letters of No. 4 (Jaeger). The lens is not displaced, and it and the other media and the fundus are quite normal."

Other cases already published by various authorities are quoted. In conclusion Mr. Windsor says, "the effect of the suture has been too palpable to leave room for doubt. I think it is clear that whenever a wound of the sclera or cornea gapes, a suture should be applied, unless there is some special contra-indication. Chloroform should be generally employed, and the thread should be very delicate. If it causes little or no irritation, it will be usually the best plan to wait for its spontaneous discharge. The principal objections to the suture are the frequent necessity of chloroform for its insertion, and possibly for its removal; the difficulty of inserting it, and the risk of exciting inflammation." The latter appears to be very slight, judging by the cases hitherto recorded.

I may conclude with the suggestion that, as union at once followed in my case though the edges of the wound had been separated for many weeks, similar treatment would not be unlikely to have a similar effect in fistulæ of the cornea and sclerotic, which it has been hitherto found to be so difficult to close.—(Reprint from Manchester Med. and Sur. Rep., 1871.)

EXOSTOSIS OF THE ORBIT—REMOVAL—RECOVERY.

Letenneur (*Gaz. des Hôp.*, 1871, p. 462) relates a case in which he successfully removed a large exostosis from the inner angle of the left orbit. It probably grew from the lachrymal bone.—(*Annales d'Oculistique*, January—February, 1872, p. 127.)

THE MODE OF PRODUCTION OF EXOPHTHALMIC GOÎTRE.

R. Boddaert has made experiments on the production of exophthalmic goître (*Bull. de la Soc. de Méd. de Gand*, April 5, 1870, and December 5, 1871). He has produced exophthalmos in rabbits by ligaturing the external and internal jugular veins at the root of the neck on both sides, and also dividing each cord of the sympathetic. The exophthalmos is produced almost immediately, and diminishes when the animal is lifted up by the ears, and increases when the head is dependent. Ligature of the four veins alone produced a transient exophthalmos. Division of the sympathetics only produces retraction of the eyes within the orbits. From the results of twenty experiments he concludes—

1. That the ligature of the veins and the division of the sympathetic nerves produce a very marked exophthalmos, which remains for many days, and diminishes gradually in proportion as the collateral circulation becomes established, and as the effects of the section of the sympathetic tend to disappear.
2. The exophthalmos is due to the venous congestion within the orbit, and disappears on tying the carotid arteries, or putting the body in such a position that gravitation favours the venous circulation.
3. The influence of the section of the sympathetic is a real factor in the production of the exophthalmos. That resulting from ligature of the veins only is less marked, and disappears more rapidly.—(*Annales d'Oculistique*, January—February, 1872, p. 125.)

THE REGENERATION OF THE CRYSTALLINE LENS IN CERTAIN MAMMALS.

B. Milliot has written a long and able monograph on this subject (*Journ. de l'Anat. et Phys.*, Paris, January—February, 1872). His conclusions are given in the *Annales d'Oculistique* of same date.

HOSPITAL GANGRENE AFTER REMOVAL OF EYEBALL, &c.

Dr. Warlomont relates a case in which he removed both eyelids and the eyeball for epithelioma of the eyelids. On the eighth day the wound was attacked with the pulpy form of hospital gangrene; it was covered with a grey, lardaceous, adherent mem-

brane. He sprinkled the whole surface with a layer of powdered camphor, and then applied simple cerate and a compress. The next day the surface looked much more healthy, and in another 24 hours there was no further cause for anxiety. The patient recovered quite well.—("Annales d'Oculistique," November—December, 1871, p. 296.)

CIRCUMSCRIBED CHOROIDITIS.

Dr. A. Sichel (fils) narrates six cases of circumscribed choroiditis, and makes some remarks on the disease. This affection was first described by Jaeger, under the name of "alteration in the region of the yellow spot." Dr. Sichel thinks, however, the particular characteristic is the presence of a change analogous to that met with in disseminated choroiditis, but localised in one part of the fundus. This spot is often, if not generally, situated away from the macula lutea. The ophthalmoscopic appearances are given at considerable length. As to the pathological changes which occur, the opportunities for *post-mortem* examination in cases of circumscribed choroiditis have been exceedingly rare, and only in advanced stages. By examination of the fundus of the eye during the development of the disease by means of the erect image, the following changes have been detected. First of all is observed a slight swelling, situated in the choroid, and slightly elevating the retina. The pigmentary layer looks more or less displaced and indistinct, the fundus seems to absorb more light, and a slight serous effusion is perceptible. Before long, in addition to the twisted and opaque aspect of the affected spot, a brownish tint becomes diffused over the surrounding parts. At the same time if the patient happens to be fair, and the vascular trunks easily seen, a well marked congestion of the vessels can be recognized. The next step is that the deep tint of the affected part becomes paler, and is overshadowed with a whitish film, which hides the vessels, hitherto seen so distinctly. The white exudation becomes thicker and thicker, so as completely to hide the subjacent layers. In other cases, and, perhaps, more frequently, in the middle of the deeper coloured portion, two or three brilliant yellowish spots appear in close juxtaposition, reflecting the light strongly, and resembling fat globules. These small, brilliant spots increase rapidly, become confluent, and form one patch. After a short time, as the patch increases in size, its yellowish white tint becomes shaded with grey, more or less pronounced, and also it forms a marked projection beyond the level of the surrounding parts, and simulates more or less the development of a tumour. These appearances can be accounted for on considering the fact of the presence in all the lower animals, of one or more oil globules in the centre of the pigmentary cells of the choroid, as demonstrated by H. Müller. These oil globules are

more numerous the further one passes from the posterior pole to the peripheral portions of the fundus. This therefore probably occurs in man, and the process above described consists in fatty degeneration of the cells. The affection is much more commonly met with in the peripheral portions of the fundus beyond the equatorial region than in the central parts. This is true also of disseminated choroiditis, which may be regarded as a repetition of the above changes in many positions. Finally by the rupture of the cell and the proliferation of the oil globules, the pigment is set free, either in the midst of the fatty mass, or is driven by it into new situations. Later than this proliferation ceases, and a retrograde change occurs. The pigment granules cannot undergo absorption, however, and there is nothing to prevent their migration.

M. Morano insists on the great probability that the pigmentary layer of the choroid really belongs to the retina. He has, by a series of very excellent preparations, demonstrated that the pigment epithelium is provided with processes which insinuate themselves between the rods and cones of Jacob's membrane, and reach as far as the external limiting membrane, and even the granular layer of the rods. The epithelial cells, in fact, are not really of the pavement type, but rather cylindrical.

The pigment having once reached Jacob's membrane may be arrested there and accumulate. For this to occur it is necessary that the layer of rods should be unaffected. Generally this is not the case. After the pigmentary granules have formed groups more or less rounded, it not unfrequently happens that the black colour of the latter becomes less intense; they become scattered, and in the centre are swollen, greyish, indistinct, or even opaque. The granules re-collect at the margin of the patches, and form circles more or less complete. The centre of a circle instead of being depressed stands out in relief and is of a dirty grey colour, which soon fades in its turn. The greyish patch becomes covered with numerous small capillary vessels, as if a tumour were developing, or rather as if adhesion were occurring between the layer of rods of the retina and the capillary layer of the choroid. Soon a retrograde change occurs again. The vessels disappear, the colour fades and becomes of a pearly lustre, but through the patch can be seen faintly other vessels more deeply placed. These prove to be the vasa vorticosa, and the pearly appearance is due to the sclerotic. Finally the vasa vorticosa atrophy and only exposed sclerotic remains.

Four stages in the progress of a case of circumscribed choroiditis may be defined:—1. One of hyperæmia and local congestion. 2. One of exudation and fatty degeneration. 3. One of pigmentation. 4. One of atrophy.

The subjective symptom first noticed is that of a musca, fixed in position, but altering in shape, and sometimes scarcely noticed.

Later intolerance of any change from a dull to a brighter light is complained of, and the flame of a candle appears to have rays like the tail of a comet passing away from it. Pain more or less intense is complained of in the eye, and the globe is tender to the touch at one spot. Finally the musca becomes a true scotoma.

The causes of the disease are obscure. In no case has the author demonstrated the presence of syphilis. Habitual constipation, suppression or irregularity of menstruation, cessation of bleeding from piles, chlorosis, and myopia, are often associated with the affection.

The course of the disease is sometimes rapid or acute, sometimes chronic. In one of the cases the affection passed through its various stages in a few weeks, but in the majority the duration was three months or more. There is no tendency to improvement without treatment. The author relies chiefly on leeching (artificial) to the temple followed by seclusion in a dark chamber. A second remedy is friction with strong mercurial ointment on various parts of the body; a third in the use of biniodide of mercury and iodide of potassium; and, lastly, the employment of flying blisters to the forehead and temple.

CASE 1.—The patient was a vigorous adult male, æt. 36, who had always had excellent health. He was much exposed to strong light in photographic work. Six years previously he had had a severe attack of photophobia, during which he had to keep in the dark. Twenty-five leeches were applied round the anus, and he took a grain of quinine daily. He recovered in about a month. He had had repeated attacks since that time. His last attack had existed three weeks. At the upper and inner part of the eyeball pressure gave pain, and the ophthalmoscope demonstrated the presence of a patch of a deep reddish-brown colour at the upper and inner part of the fundus rather beyond the equator. The artificial leech was applied, purgatives administered, and absolute rest of the eyes enjoined. At the end of eighteen days all the symptoms had disappeared.

CASE 2.—Patient a robust female, aged 34. Three years previously she had noticed a musca. For three or four weeks frontal pain had been noticed, and for a fortnight intense photophobia. A spot on the upper and outer part of the eyeball was sensitive to the touch; there was a large scotoma, whilst, in the dark, numerous flashes of light were complained of. At the upper and outer part of the fundus midway between the ora serrata and the equator was a series of whitish or yellowish-white rounded spots. They were arranged in a curve with the concavity inwards. Each was surrounded with a narrow reddish-yellow margin, contrasting strongly with the red tint of surrounding parts. There appeared to be slight œdema of the retina. A similar treatment to that of the previous case was followed by some improvement. In twelve days mercury and iodide of potassium were ordered. At

the end of a week a notable improvement had resulted. The patient, who could not read any letters before, read No. 8 J. In another week she could read No. 3 J.

CASE 3.—A man, aged 26, of fair complexion, pale, myopic. He had a central scotoma, which at a distance of two feet covered a two-franc piece. The affection had been noticed for a fortnight or three weeks. The ophthalmoscope showed a posterior staphyloma, and at the yellow spot a reddish-brown granular patch, about four-fifths of the diameter of the optic disc in width, having its margin more deeply tinted and irregularly dentated. There were a few dots of pigment. The retina was distinctly but slightly elevated. The ophthalmoscopic examination gave great pain. During the progress of the case (given at length), in spite of treatment and some temporary amelioration, the disease passed on to atrophy of the choroid with impairment of the retinal bacillary layer.

CASE 4.—A man, aged 28, vigorous, in good health. He had divergent strabismus of the left eye. He applied on account of a recent defect of the other eye due to cataract. In the left eye, defective from the age of 12, a large patch of atrophied choroid was found in the region of the yellow spot. The appearances are given at length.

CASE 5.—A female, aged 25, chlorotic, suffering from dysmenorrhœa, headache, constipation, &c. Two years previously she had suffered from symptoms analogous to those in Case 2, and was treated by Dr. Sichel (père), whose treatment was followed by amelioration. When examined at the time of her second appearance (end of two years) a patch of white such as previously described was found at the macula lutea, measuring about five times the diameter of the disc. Above the latter was another patch, measuring about twice the size of the disc and with two prolongations like tongues of flame. After the administration of tonics vision improved. A portrait of the conditions will appear in the Supplement to the "Iconographie."

CASE 6.—The patient, a male, aged 42, of large build and sanguine temperament, had noticed the defect for a fortnight. For two days he had been obliged to give up work. He was myopic. The region of the optic disc was hazy and staphylomatous. In the extreme periphery, inferiorly, was a group of small spots of a greyish-white colour, and eight or ten in number. They were slightly elevated. The artificial leech was applied, and iodide of mercury and potassium given internally. At the end of two months he could spell 12 J., whereas he had not been able to distinguish a character. The peripheral spots had become brilliant white (sclerotic). Two of them were encircled in a ring of pigment.—("Annales d'Oculistique," March—April, 1872, pp. 129—156.)

EXTRACTION OF CATARACT WITHOUT OPENING THE CAPSULE
OF THE LENS.

Dr. Hermann Pagenstecher, of Wiesbaden, writes on this subject in the "*Annales d'Oculistique*," September—October, 1871, p. 126. Some years ago his brother, Dr. Alexander Pagenstecher, published the results of sixty-three cases. Since that time 140 cases have been treated, and the lessons derived from them are as follow:—

In many respects the conclusions formerly arrived at have been confirmed, but it has gradually become evident that the method is more adapted for certain kinds of cataract than for others. The slight resistance offered in a certain number of cases by the capsule, or its firm union with the zonule of Zinn, would prevent the plan being generally adopted. On the other hand, it would appear to be particularly adapted to those cases in which the resistance offered by the capsule was greater in proportion than that between it and the zonule. Under this category would come nearly all cases of senile cataract, whether hard and undergoing degeneration or soft, and also those in which, after a slow development of the opacities, certain portions of the cortical substance have remained transparent, and the cataracts would never become wholly mature. These cataracts are, generally, of no large size, and the union of the zonule to the capsule offers very little resistance. Very often the cortical layers have undergone degeneration, and the cataract has a flattened form. Dr. Pagenstecher has often examined such cataracts immediately after extraction, and has ascertained that the cortical substance shows very little opacity. Generally a very slender belt is formed around a very large and opaque nucleus. The fibres of the cortex appeared separated, and the most transparent parts showed evidences of fatty and myeloid degeneration. The opacities visible to the naked eye were caused by accumulations of drops of oil of a myeloid substance and of fibres in the course of destruction. In the nucleus itself were fibrils which were opaque certainly, but which were in a normal situation and of normal size. The epithelium of the anterior capsule was generally in good preservation. In a few cases it was completely destroyed; in others it had undergone changes. Between the normal cells had become developed others two or three times as large, generally round, and containing two or three nuclei. This condition had resulted from the fusion of two or three cells into one. The third group of cataracts adapted for removal without opening the capsule, comprises those consequent on irido-choroiditis or iritis, and in connection with circular posterior synechiæ. In these cases it is necessary to overcome the adhesions between the capsule and the iris. This is accomplished by using a small silver hook with a blunt point. A fourth group consists of the

cases in which cataract coexists with irido-donesis. This phenomenon may be caused either by degeneration of the lens or by diminution of the bulk of the vitreous. The latter condition almost always presupposes atrophy of the zonule. In the last two classes of cases it is especially important to preserve the iris from the irritation of *débris* of the capsule or of lens matter, because of the tendency to inflammation, and therefore the operation of removal of the lens in its capsule is very appropriate. Lastly, cases are occasionally met with in which, during the operation, before the capsule is opened, an escape of vitreous occurs. On all occasions, therefore, even when it is intended to open the capsule, an operator should be prepared to use a scoop. As the indications as to the kind of cases adapted for the operation have undergone modifications, so have the operative procedures. Instead of cutting a flap, a linear incision upwards with a free iridectomy is practised. In a few cases it happens that after this has been done very slight pressure on the lower border of the cornea causes the lens enclosed in its capsule to present at once, and the extraction can be accomplished without further trouble. In the greater number of cases a special kind of scoop, made by Weiss and Son, is employed. This scoop is introduced carefully behind the equator of the lens, and then gently passed over its posterior surface till it touches the lower border. In order to facilitate this manœuvre gentle pressure can be employed over the inferior border of the lens, and thus its superior border be tilted forwards. After a slight rotation, produced by a change in the direction of the spoon, so that its handle is carried from the middle of the wound towards the internal angle, the lens is drawn upwards. At the same time the handle of the spoon is depressed towards the margin of the orbit. The slight pressure of the lens which occurs against the cornea prevents its slipping from the concavity of the spoon. The extraction is further much assisted by gentle pressure on the lower border of the cornea with a curette made of caoutchouc combined with a slight movement from below upwards. Chloroform is only used at the patient's special request, as it has not been found necessary since the employment of Graefe's incision with iridectomy. The escape of vitreous also much less frequently occurs, and, when it does occur, it is to a slighter degree. The after-treatment is the same as after other methods of extraction. The advantages of the operation are summarised as follow:—There is no tendency to iritis. In 200 cases iritis has not occurred, primarily, in one. No secondary operation is requisite. The vision is more acute than after any other procedure. In twelve per cent. the acuteness is normal. The number of failures is not greater than after ordinary linear extraction. The defects of the operation are the difficulty which is met with in performing it and of making an exact diagnosis

as to its advisability. Escape of vitreous has never been a source of failure. The anterior part of the vitreous sometimes becomes opaque after the operation, but this is not very prejudicial, because the affection soon passes off; its intensity is not in accord with the amount of vitreous lost. It has been frequently observed that after the loss of a considerable quantity of too fluid vitreous, the remaining vitreous has continued quite transparent.

EXTRACTION OF CATARACT.

In a letter written by Dr. Mazzei, of Florence, and communicated to the "*Annales d'Oculistique*," September—October, 1871, are some remarks on the various methods employed for the extraction of cataract and a description of a new method. The knife used resembles that known as Graefe's, but is not of the same size. Instead of the length being 30 mm. (an inch and a fifth), it is reduced to 24 mm. (.96 inch), whilst the breadth is 3 mm. (.12 inch) instead of $1\frac{1}{2}$ mm. (.06 inch). The thickness is the same in the two instruments. The patient having been placed on the couch, and the eye which is not to be operated on being covered with a bandage, an assistant raises the upper eyelid, taking care not to lift it too much. The operator steadies the eyeball with the index and middle fingers of the left or of the right hand, according to the side operated on. The knife is then thrust into the sclerotic at the lower third of the sclero-corneal margin, taking care to direct the point of the knife, at first, towards the centre of the pupil, that is, at an angle of 40 degrees with the tangent of the lower curve of the cornea. The blade is pushed on, in the same direction, until its widest part enters the wound, when the direction is altered to one parallel with the inferior tangent of the cornea, that is, the knife is placed horizontally and a counter-puncture made on the opposite side opposite the point at which the knife was entered. Hitherto the edge of the knife has been directed downwards, but at this stage it is turned forwards at an angle of 45 or 50 degrees, and the incision is completed by a slight sawing movement of the knife. The capsule is then opened and an attempt made to extract the cataract by pressing lightly with a curette below the wound and with the assistance of the thumb of the other hand. Patients behave much better at this stage of the operation than when any other plan is adopted, because they have not been annoyed by the use of elevators or of forceps to fix the globe. If the lens does not come out easily, or if a portion of iris becomes entangled in the edges of the wound, iridectomy is practised, and this is also had recourse to if the opening in the cornea has not been made large enough. If the situation of the counter-

puncture be carefully attended to, the corneal opening can always be made of sufficient extent.

The after-treatment is simple. Six hours after the operation atropine is used and a compressive bandage applied and changed every twelve hours, the drops being used each time. At the end of three days, if all has gone well, the bandage is left off. The atropine is continued for twelve days. If the result is not favourable, each case must be treated on its own merits. For the first three days the patient's diet is restricted and he is kept in bed. The following advantages are claimed:—1. Simplification of the operation. 2. Preservation, almost invariably, of the integrity of the iris. 3. Less constraint and pain suffered by the patient, as the lids are not forcibly separated by a speculum. To these may be added the fact, that after this operation the area of the pupil is less often obstructed by opaque capsule. If chloroform is used, of course the patient feels no pain whichever plan is adopted; but at Boulogne they never use anæsthetics, so that it is important to make the operative procedures as painless as possible.

THE CONDITION OF VISION IN VERY YOUNG INFANTS.

Dr. L. Cuignet gives the results of his observations on the vision possessed by young infants. He thinks that the function of sight is progressive, being only imperfectly exercised for some months, and that the eye is very susceptible to light, this susceptibility passing off very slowly. He has carefully experimented on two infants. The whole of the first day after birth was passed in uninterrupted sleep. The second day the baby opened its eyelids, but shut them and began to blink on exposure to the light from a window, but again opened them and looked about when its face was turned from the light. If he were exposed to a moderate light he would open first one eye and then the other. If both were open he squinted with one, more frequently the left (convergent squint). On the sixth day he seemed annoyed by prolonged removal from the light, and would be quite still if a candle were lit and thus surrounding objects dimly seen. On the eighth day his sleep became interrupted by intervals of half-an-hour or an hour, during which he seemed to look steadily at objects with an air of consciousness. It seemed evident that his intellect was beginning to be developed, for his hands moved towards an object at which he was looking as if with a confused intention of touching it. Daylight still compelled him to shut his eyes. When a lighted candle was held at a distance of from six to nine feet he would look at it steadily; if the candle were brought nearer (at two feet or one and a half, or one foot) he squinted extremely, and in spite of his wish to look at the flame, which pleased him, he was obliged after a while to close his eyes.

There was photophobia therefore, inducing a squint in order to remove one eye from the light. On the twentieth day the baby could open its eyes better and look about by rolling the eyes without moving the head, but its look had neither expression nor precise intention. It always feared a full light and squinted strongly when exposed to it. It slept more in the daytime than at night, probably because of the susceptibility of the sight and the rapid fatigue which resulted even from a short exercise of the power of vision, forcing it to close its eyes and yield to the torpor due to the absence of all sensorial impression. He would remain awake for a long time at dawn, and in the twilight would stir himself, cry out, and look about him and stretch his hands out towards objects which he perceived. It was suspected that his range of vision was limited and that he could not see with the peripheral portions of the retina, that is, that he could only see for a short distance and straight before him. As he already took some notice of the flame of a candle, an attempt was made to confirm the above suspicion. It was found that in a dimly lighted room he would look attentively at a candle held before him at a distance of from three to six feet, but if this were suddenly moved a yard in any direction he ceased to see it and looked vaguely in other directions. If he happened accidentally to look in the right direction he would then "fix" anew, or if the candle were brought back to its original position he saw it again. He lost sight of the candle in whatever direction it was moved, even though its position had been but slightly altered. Moreover, when the candle was moved to a distance of nine, twelve, or eighteen feet straight in front of him, the baby could not see it. If it were brought back to a distance of six or nine feet he again saw it. If the candle were brought nearer (eighteen inches or less) convergent strabismus, winking, and finally closure of the eyelids followed. It would appear that the state of the vision is in accordance with the state of cerebral development; that the infant has, from its birth, a very marked power of convergence, which is the principal agent in the production of permanent strabismus at the same time that the excessive sensitiveness of the retina is its primary cause. It is to be added that when this sensitiveness is continually excited by an abnormal condition of ocular refraction, hypermetropia (much more common in the young than myopia), the photophobic convergent strabismus becomes very manifest and remains permanently.

On the twenty-eighth day after birth it was noted that the baby desired to be carried about whilst awake, and would remain awake for an hour or two, and would look about with some sort of curiosity, unless it was exposed to strong daylight or sun light. It opened its eyes widely and did not blink. On the thirty-sixth day he was taken out of doors, and could bear the light. If, however, he looked at a light which was close to him,

or even at any object closely, he still squinted. He did not recognise any one by sight, it did not matter to him who took him and carried him about, but he knew his mother's voice. It was not till the sixtieth day that it was certain that he recognised his mother by sight. He would look at her attentively and smile at her, but not at any one else, and he did not like strangers. It pleased him to see the large flowers on a curtain and to be carried about in a well-lighted passage. At the age of two and a-half months he could not "fix" an object at twenty feet distance, and all attempts to attract his attention by a light held on one side were unavailing. If a noise were made on one side of him, he would attempt to turn his eyes and his head to that side. At the age of three and a-half months it was evident that he had a larger field, and he would watch the movements of his brothers playing at a considerable distance.

At the age of four months it was still evident that his sight was not fully developed either in a direction straight before him or laterally.

One means, amongst others, adopted to test this was, to attract the child's attention while he was seated on his mother's arm, and get him to look at some one stationed behind his mother, the child looking on one side of his mother's head.

If then the person behind moved to the other side, the child lost sight of him, though the actual lateral movement was very slight. It was not till the age of five months that the field of vision seemed nearly normal. He now seemed to have sufficient muscular power to hold his head up and turn it wherever he wished. At six months it seemed quite evident that he could see widely and at a great distance.

There was no photophobia. Parents and nurses often say that squints have been caused by exposing babies in their cradles to too strong a light, but the permanent squint is generally not observed till the age of one or two years, and hypermetropia is generally present. — ("Annales d'Oculistique," September—October, 1871, p. 117.)

EMPHYSEMA OF THE EYELIDS, &C.

Dr. Gruening relates two cases in which after blows on the forehead, violent blowing of the nose, was followed by emphysema. In one case the eyelids and the orbit were emphysematous, and one eyeball protruded. In the other, only the eyelids and adjacent parts were affected. The first case was lost sight of. The second recovered quickly. The treatment consisted in compression, and a recommendation for the patient to abstain from blowing his nose. In the first case probably a fracture had implicated the posterior portion of the inner wall of the orbit—the os planum of the ethmoid. In the second, probably the fracture

was further forwards.—(Archives of Ophthal. and Otol., 1871, p. 184.)

THE LIGHT-STREAK SEEN IN THE CENTRE OF THE RETINAL VESSELS
WITH THE OPHTHALMOSCOPE.

Dr. Loring believes that the co-called double contour of the retinal arteries as seen with the ophthalmoscope, depends on the transmission of light reflected from the fundus through the centre of the vessel, not on the reflection of light from the surface of the vessel. The light striking the wall of the vessel nearest the observer passes through this, on account of its transparency, without being reflected to an appreciable degree; traverses the contents of the vessel, and is then reflected back, slightly from the opposite wall, but principally from the subjacent tissues. The condition of the latter determines the presence or absence of the light streak. His belief is founded on the following data. The light streak is too broad to be a simple reflection from the vertex of a curved surface, whether of the wall of a vessel or of its blood column, as Jaeger supposes. The column of blood is too transparent and too reflecting to give so brilliant a streak. The light streak ought always to be present as long as the vessels remain full, and the fuller they are the denser the column of blood and the greater the reflexion. If venous pulse be present, the light streak will be seen to appear when the vein is empty, and to disappear when the vein is full.

If the retina be detached, the light streak disappears at the point of commencement of the detachment. If a glass tube filled with a red fluid be placed in front of a reflector situated at the bottom of a cylinder lined with black, and then light thrown in with an ophthalmoscopic mirror, the centre of the red tube will appear of a light colour, while the border above and below will be dark. If the reflector be perforated in one place, the whole width of the tube at this spot will be of a uniform colour. So also if the tube be placed over a non-reflecting surface, the tint will be uniform. This would not happen if the phenomenon of the light-streak depended on the vessel (or tube) itself.—(Archives of Ophthal. and Otol., 1871, p. 95.)

INJURIES OF THE EYEBALL, &c.

Dr. Aub narrates cases of injuries of the eyeball and its surroundings.

Foreign body behind the Eyeball.—One patient, a man, aged 24, had been struck by a "spike" discharged from an air gun. Those who were present declared that the spike came out again from the eye. There was a wound of the cornea, and the eye

was utterly lost. Some "woollen" fibres were detected in the collapsed eyeball and occasionally were present in the purulent discharge. After three weeks an opening in the conjunctiva was made, and a foreign body, at one end of which was a cast-steel point and at the other some woollen fibres was removed from behind the eyeball. Its total length was eight-tenths of an inch. The projectile must have pierced the whole eyeball and lodged with its point in the orbit, the posterior scleral wound being filled up by the end of the woollen fibres. As suppuration progressed and the eyeball shrank, the scleral wounds became closed and the pus formed an exit through the conjunctiva, pushing the eyeball aside. The patient ultimately had a very good stump which bore an artificial eye well.

A case of *suppurative choroiditis* is mentioned in which a piece of steel having penetrated the eyeball, worked its way out gradually in the course of about a week, and was removed with forceps from a swelling over the external rectus muscle. An ulcer of the cornea and hypopyon which were present gradually diminished, and finally vision = $\frac{2}{70}$, and $1\frac{1}{2}$ (J.) at 10".

Rupture of the Choroid, Central and Peripheral, &c.—An interesting case of rupture of the choroid is given. A lad, aged 14, was struck in the eye by a piece of wood. An opacity of the posterior part of the lens and dense opacity of the vitreous were early symptoms. The opacity of the lens was considered to be due to rupture of the posterior capsule. At the end of a fortnight the outer half of the optic disc was seen covered with blood clot, and there was another clot between it and the yellow spot, and at the yellow spot there was a third. At the anterior and outer part of the fundus, at the junction of the choroid proper, with the ciliary portion of the uveal tract, a gap was seen extending upwards and backwards, and its borders were lined with pigment. As the fundus cleared a branching rupture of the choroid was visible at the yellow spot, and a white atrophic patch was left where the blood clot had been between the latter and the optic disc. "This case is of special interest, since it is the only one on record in which a simultaneous rupture of the choroid at the macula lutea and at the periphery existed. That the choroid and retina were torn at the ora serrata is proven by the fact that the choroidal hæmorrhage escaped freely into the vitreous and left no blood collected between the choroid and retina." The peripheral rupture was probably direct, the central one the effect of contre-coup. The ultimate result was a slight amount of vision in the lower and outer portion of the field.

A case of *dislocation of the lens into the vitreous with preservation of good sight* is narrated. Also a case of *gunshot injury to the eyeball without marked lesion, with remarkable disturbance of sight and perfect recovery*. The position of the lens was suspected to have been altered, but was not considered to account for the

whole of the symptoms.—(Archives of Ophthal. and Otol., 1871, p. 187.)

IRIDECTOMY WITHOUT DIVISION OF THE SPHINCTER PUPILLÆ.

B. A. Pope advocates the performance of iridectomy without dividing the sphincter pupillæ. He thinks this advisable in cases in which there is a central opacity of the cornea, and in which there has been some inflammation of the eye; in cases in which there has been perforation of the cornea with prolapse of the iris; in those in which there is diffused corneal opacity, most marked centrally together with iritis or irido-choroiditis, with or without iritic adhesions, and in cases in which an extremely eccentric pupil may be required and internal disease may exist. The double pupil which results has not been followed by any inconvenience.—(Archives of Ophthal. and Otol., 1871, p. 87.)

PARALYSIS OF ACCOMMODATION.

Dr. Colsman relates ten cases of paralysis of accommodation, coming on suddenly and gradually, followed by recovery. Three of the patients were adults, in whom the affection had come on after over-use of the eye. In one case, that of a child, the paralysis followed measles. In two children it followed sore throat. In one adult no cause could be assigned. In two cases syphilis was the cause; and in one it followed after an attack of herpes zoster frontalis.—(Archives of Ophthal. and Otol., 1871, p. 154.)

CONICAL CORNEA.

Dr. Steinheim narrates three cases of conical cornea in which Graefe's operation was followed by satisfactory results. The first patient, a man, aged 21, read only 3 and 4 (J.) at a distance of three-quarters of an inch or an inch. Six months after the operation he read 1 (J.) at five inches. His distant vision = $\frac{2}{5} \frac{0}{0}$. The second patient was a man, aged 37. He read 6 (J.) at $1\frac{1}{2}$ ", and counted fingers at four feet. Afterwards he read 1 (J.) at 2", and with $-4\frac{1}{2}$ " his vision = $\frac{1}{10}$. The third patient was a man. With the right eye he could read 3 (J.) at $\frac{3}{4}$ ". The largest type could not be seen further off than 3". With the left eye he read 4 (J.) at $\frac{3}{4}$ ", and could count fingers at two feet. The eye was operated on, and at the end of the eighth week he could count fingers at seven or eight feet, and with $-4\frac{1}{2}$ " as far as eighteen feet. He could read No. 1 (J.) at 4", and with $-4\frac{1}{2}$ " his vision = $\frac{1}{2} \frac{6}{0} \frac{0}{0}$.

Dr. Steinheim attaches especial importance to the establishing

of a fistula for some time, and of encouraging a thinning of the base of the ulcer which is formed over a considerable extent.—(Archives of Ophthal. and Otol., 1871, p. 166.)

SYMPATHETIC OPHTHALMIA WITH NEURO-RETINITIS.

Dr. Pooley narrates two cases in which neuro-retinitis occurred in eyes sympathetically affected. The first case was that of a boy, aged 9 years. One eye was injured July 27th, 1869. The other became inflamed August 24th. On October 11th, though the vitreous was somewhat hazy, the optic disc could be seen. The vessels were tortuous and the disc was covered with exudation. The fundus became more obscured, and very little sight was ultimately left. An account of the microscopical appearances of the injured eyeball which was removed is given. The second patient was a man, aged 59. At the age of 19 one eye was injured, and was liable to attacks of inflammation. Four months before his admission he again injured the eye. Three weeks previously a "fog" had appeared before the other eye. Hyperæmia of the optic disc, uniform and semi-transparent exudation on and around the disc, the borders of which were completely concealed, were found. The injured eye was enucleated, and the vision of the other eye ultimately improved to $\frac{2}{30}$. An account of the examination of the injured eyeball is given.—(Archives of Ophthal. and Otol., 1871, p. 284.)

PTERYGIUM SUPERIUS.

Prof. Knapp says that he had never seen a case of superior pterygium till lately. After an epidemic of ophthalmia among a number of children two were affected with this malady. He operated on one. The patient was a girl, 11 years of age, whose left eye presented a well-developed, rather thick and vascular pterygium. Its basis was connected with the whole superior reflexion of the conjunctiva, while its apex overlapped the cornea so far as to cover the pupil entirely. A probe could be passed beneath it. It was detached from the cornea with a cataract knife, and it then shrank up, leaving a zone of healthy conjunctiva between the cornea and the base of attachment. It was, therefore, left without any further interference, and in a fortnight the mass had almost entirely disappeared. There was a central adherent leucoma of the cornea. The pterygium is formed while the cornea and conjunctiva are ulcerated, and the lids remain closed for some days. It seems surprising that such a condition does not result oftener, but probably the adhesions separate spontaneously. In the other case the pterygium did disappear spontaneously.—(Archives of Ophthal. and Otol., 1871, p. 54.)

GLIOMA OF THE RETINA.

Prof. Knapp gives a very detailed account of a case of glioma of the retina in the Archives of Ophthalmology and Otology, pp. 36—51, 1871. The origin of the growth was found in small, more or less circumscribed clusters, lying in the inner granular layer of the retina. These clusters were the most luxuriant part of the new growth, and extended in every direction, but principally towards and beyond the outer granular layer. In many places the outer granular layer was the seat of the proliferating elements, while the other retinal strata were exempt from them. At other points the inner layers of the retina were filled with glioma cells, which entered through the *limitans interna* into the vitreous; the main bulk, however, springing from clusters situated in the inner granular layer. Prof. Knapp calls particular attention to a fact which puzzled him much at first, that the outermost layers of the tumour forming its outer smooth surface, were unmistakably the inner layers of the retina. This is illustrated by figures. The whole growth, with the exception of one point, was enveloped by the detached retina. The *limitans interna* forming the surface of the new growth was in contact with the *limitans interna* of the enveloping retina, or separated from it by a free space filled with fluid.

TUMOURS OF THE RETINA.

Dr. Francis Delafield, of New York, narrates five cases of tumour of the retina. The first specimen was taken from a girl, aged 18 months. Her father had noticed a white spot in the pupil three months previously. There was no return of the disease at the end of two months after the operation, but the patient was then lost sight of. In the second case the patient was a child aged four. The disease had been noticed for two years. The child died in a year after the enucleation. The third patient was a girl four years old. Ten months previously the eye became red and painful, and the pupil had a greenish aspect. Six months before removal of the eye a tumour, the size of a pea, could be made out by the ophthalmoscope in the outer portion of the fundus. Within four months after the extirpation a tumour appeared in the orbit, and a few months later the child died. A tumour was found in the brain at the optic chiasma. In the fourth case the patient was a boy two years old. An opacity in the pupil was noticed one year before enucleation. Within four months vision was destroyed, and the eyeball began to protrude. A tumour situated in the upper and outer part of the orbit, and attached to the globe, was removed with it. One month after removal a growth appeared in the orbit. Soon afterwards the

sight of the other eye was lost, there was hemiplegia, marked evidences of cerebral disease, and the child died in a short time. In the last case the patient was a girl two and a-half years of age. Six months before the enucleation it was noticed that the pupil was enlarged. Six weeks later the tumour recurred in the orbit, and afterwards growths appeared on the temples and in the inferior maxilla; the vision of the other eye was lost, and death followed in three months after the operation. Four of the specimens showed the methods by which the new growth spreads from the retina to the neighbouring parts. The choroid, optic nerve, episcleral tissue, sclera, brain, and periosteum of the cranial bones became the seats of secondary tumours. The optic nerve was involved, and presented similar changes in each. The bundles of nerve fibres had disappeared, and were replaced by round cells. The fibrous septa remained unaltered. The cells formed a continuous growth with the retinal tumour. The two sheaths of the nerve were very little altered in any of the cases, and in only one were there cells between the two. Most authors describe the new growth as advancing along the fibrous septa and sheath of the nerve, leaving the nerve bundles untouched to the last. In the choroid the secondary tumours occurred by discontinuous infection. Separate foci were formed beneath the epithelium and in the stroma. In the sclera the secondary tumours were small, and formed of aggregation of cells separating the fibrous tissue. The tumours outside the sclera were in two cases of large size. In one case tumours grew from the periosteum of the cranial bones. The following conclusions are arrived at:—

1. The rule laid down by Hirschberg, that retinal tumours grow outwards towards the choroid has many exceptions.
2. The elements of these tumours only resemble the granules of the retina as when altered by reagents and seen with low powers. When examined fresh, and with high powers, they are seen to be identical with the so-called lymphoid cells which compose so many new growths.
3. If we dismiss from our minds the superficial resemblance between the elements of these tumours and the retinal granules, they at once take their place in the class of round-celled medullary sarcoma.
4. The variation in the size of the cell-body and in the proportion of stroma in different parts of these tumours, is almost always found. This variation is the same which we find in most sarcomata, and is no reason why we should speak of a tumour as beginning as a glioma, and then becoming sarcomatous.
5. Not only the anatomy, but also the clinical history of retinal tumours corresponds exactly with those of the medullary sarcomata.
6. The development of secondary tumours follows the rule laid down by Virchow for sarcomata; and occurs (1.) By continuous infection of the retina, optic nerve, and perhaps the brain; (2.) By discontinuous infection forming the choroid, scleral, and episcleral tumours; (3.) By

metastasis proper, forming tumours on the bones, lymphatic glands, and liver.—(Archives Ophthal. and Otol., 1871, p. 58.)

STATISTICAL REPORT OF DR. WECKER'S CLINIQUE.

This Report refers to the half-year, July–December, 1871, and was drawn up by Georges Martin.

Operations for Cataract.—These were 95 in number; 86 of spontaneous origin, 5 were traumatic, and 4 congenital. Excepting the latter, all were operated on by Graefe's method, modified in two particulars, as to the sclerotic section, and as to the opening of the capsule.

The sclerotic section was made as follows: the points of puncture and of counter-puncture were situated in the sclerotic at the distance of one millimetre ($\cdot 04''$) outside the corneal margin at the level of a horizontal line passing two mm. ($\cdot 08''$) below the upper border of the cornea, the instrument cutting its way out at the level of the upper corneal margin.

By this procedure a small flap was formed, of which the apex corresponded exactly with the upper border of the cornea, and whose base, situated two millimetres ($\cdot 08''$) lower, included the whole breadth of the cornea, at that level, with two millimetres in addition taken from the sclerotic (one on each side). With a cornea 12 mm. ($\cdot 48''$) in diameter, a flap of the width of 11 or $11\frac{1}{2}$ mm. would be obtained, whilst Graefe's plan would only yield one of 10 or $10\frac{1}{2}$ mm. Graefe insisted that any height of flap if exceeding one millimetre was superfluous and exposed to certain dangers. It is asserted, however, that the dangers of an operation do not depend on the opening being too large, but on its being too small. The increase in the extent of the section does not necessitate a large coloboma of the iris. This can be avoided by not making much traction on the iris before applying the scissors, and if there is any tendency for the iris to prolapse by making pressure with the convex part of the curette on the globe from above downwards. The section above described gives a larger opening, which facilitates the removal of incomplete cataracts; it is easier for the operator to perform; it is easier to follow the directions exactly by this plan than by that of Graefe, and they need not be departed from in particular cases as so often occurs in the ordinary procedure.

An operator finds less difficulty in making his point of puncture in an imaginary horizontal line at a level of two millimetres below the border of the cornea than a millimetre below a horizontal line forming the tangent to the summit of the cornea. M. Wecker's modified plan applies to all individual varieties, whereas the procedure called "peripheral," demands in some sort a special study of each case. In hard cataracts and those of large size, it is necessary to make the puncture and counter-

puncture lower, and this is also necessary if the cornea is less than 12 millimetres in diameter.

The second modification adopted belongs to the third stage of the operation. Instead of simply lacerating the capsule, M. Wecker cuts out a quadrangular flap. He uses a pair of iridectomy forceps curved, or bent at an angle, and furnished at the extremities of each branch on a level with the teeth on the inner side, with a small triangular cutting blade. A figure of them is given.

These cystitome-forceps are introduced closed, and passed as far as the lower border of the pupil; they are then directed so that the triangular extremities shall touch the capsule, and the points are separated on a level with the lower border of the pupil, to a distance of about 4 mm. (.16"), the capsule being lacerated at the same time. While the points are still separated, the instrument is drawn from below upwards parallel to the border of the artificial pupil, the capsule being lacerated all the time. When the points reach the level of the upper border of the lens, they are closed so as to grasp the flap of the capsule, and the forceps are then withdrawn closed as an ordinary cystitome. The instrument has the advantage of combining two instruments in one, and it is not a new one, the management of which requires an apprenticeship. The extremities of the cut iris should always be replaced before the capsule is lacerated, for it is much more difficult to do this after the extraction of the lens. If a flap of capsule be not always extracted, at any rate with this instrument a very considerable laceration of it is effected.

The mode of dressing adopted has been slightly modified. The eye having been washed and dried, both eyes are covered with pieces of fine linen, over which layers of unglazed wadding are applied, so as to fill up the hollow in front of the eye, and finally, a flannel bandage for both eyes, retains the dressing, exercises slight pressure on the globes, and fixes the eyelids. On the evening of the operation, a dose of chloral is given. The next day, at the first change of dressing, if the pupil is free from cuticle substance and sufficiently dilated, no atropine is used. It is only resorted to when the aqueous seems discoloured, contains cuticle matter, and the iris threatens to become inflamed. The results of the 86 extractions are given in a table seriatim. The following remarks are made:—In fourteen instances, the cataracts were immature. The patients were unable to read, but the opacity was so little advanced, that the cataracts would not have been "ripe" for 12, 15, or 18 months longer. M. Wecker operated when both cataracts were simultaneously advanced, so that the patients were unable to read or follow any occupation. It was important to make a large sclerotic section. The lens presented easily, and was preceded and followed by transparent cuticle substance. Measurement of nuclei

so extracted show that they are sometimes superior and sometimes inferior in size to the average of mature ones. The largest were the most immature; the smallest were more advanced, but still incomplete. The progress of these cases was quite without any complications, and the patients remained in hospital the average period. The acuity of vision in four cases $= \frac{2}{3}$; in four others $\frac{1}{2}$, and in the remaining six $\frac{2}{5}$. Was the fact that the acuity of vision was above the average due to the comparative youth of the patients? However that may be, the patients had they not been operated on would have remained for months or years with incomplete vision, which would have necessitated their relinquishing their operations, and the plan adopted reduced to a minimum the inconveniences of opacities of the lens.

If now we consider the general condition of those operated on, we find that four were the subjects of diabetes. One in particular was affected with a grave form of this malady. Nevertheless, these four progressed as favourably as others. In 1869 there were three cases of diabetic cataract in which a like satisfactory result followed. The only precautions necessary (if iridectomy with a peripheral section be performed) are to remove as much cortical substance as possible, and to keep up the patient's strength.

In reference to the dimensions of cataracts, the thickness seems to vary least, the average being three millimetres ($\cdot 12''$). The diameter of the largest equalled 10 mm. ($\cdot 40''$). In such as this, a sclerotic section of 11 or $11\frac{1}{2}$ mm. would be almost insufficient, for the internal section would only measure $9\frac{1}{2}$ mm.

In the whole number of eighty-six operations, in only five did any escape of vitreous occur. In one of these exophthalmos existed. The result in all of them was satisfactory. In two cases out of the eighty-six panophthalmitis followed, and in one irido-choroiditis. In one of the two former the other eye had been operated on, successfully, one week previously for mature cataract. The only predisposing cause to be suspected was the presence of a large arcus senilis, and the lens came out with some difficulty. In the second perhaps the sclerotic opening was too small. In both shrinking of the globe followed. In the third, irido-choroiditis came on, on the third day, without appreciable cause. The eye maintained its shape. In four there was slight iritis. The only result was to lengthen the patient's stay. Two patients left in four days; twenty in the first week. The average stay in hospital was a fortnight.

Of ninety-five cases operated on, failure was only met with in three, *i.e.*, 3.15 per cent. Graefe's best statistics showed a failure of 2.8 per cent. The state of vision resulting at the time the patients were tried for glasses was in four, $\frac{2}{10}$; in ten, $\frac{2}{3}$; in eighteen, $\frac{1}{2}$; in twenty-six, $\frac{2}{5}$; in ten, $\frac{7}{10}$; in four, $\frac{1}{5}$; in five, $\frac{1}{10}$. In six cases no examination was made. One patient died of pulmonary

mischief, four months after operation, without having been tried for glasses, and the others had not returned for their glasses after being sent home. Much greater acuity of vision is shown when the patients are tested a long while after extraction than when they are tried at the end of two or three weeks. It is greatly to be regretted that a uniform standard for the average acuteness to be expected is not adopted by different operators.

M. Wecker considers an acuity of less than one-fifth an incomplete result.

Iridectomy.—Sixty-one cases requiring iridectomy were operated on. Some details of them are given. Graefe's knife was used in all.

Strabotomy.—Details of fifty-three cases are given.

Sclerotomy.—This has been advocated by Quaglino, instead of iridectomy. M. Wecker has adopted a modification. Puncture and counter-puncture are made as for extraction of cataract, but on withdrawing the knife the middle third of the flap is left, as a bridge, uncut. The object is to prevent prolapse of iris. This operation has been performed seven times, with results exactly analogous to those after the ordinary iridectomy. In one case the iris became entangled at one extremity of the sclerotic wound. This operation will, however, hardly take the place of iridectomy.

Sæmisch's Operation.—In cases of ulceration of the cornea with hypopyon, the practice of iridectomy has been abandoned for the employment of the operation advocated by Sæmisch. This was performed in three cases. The cornea was incised through its whole thickness where the ulcer showed its greatest diameter. A Graefe's knife was entered a millimetre ($\cdot 04''$) from the margin of the ulcer, and brought out an equal distance from it on the opposite side, the cutting edge being held forwards. Before withdrawing it, slight lateral movements were made, to allow of escape of aqueous and bulging forwards of iris into the wound. For about a week afterwards the extremity of a small Weber's knife was passed daily between the edges of the wound, so as temporarily to establish a fistula.

In these three cases there was every reason to be satisfied with the method adopted. Improvement was most marked and rapid. On the second day a change had occurred; on the third it was evident the ulceration was checked. At the end of three weeks little trace of the disease remained. In three cases previously so treated a good result did not follow, but in these nearly the whole cornea was affected. For the operation to succeed, it is necessary that the ulcer occupy less than half the extent of the cornea, and therefore that the incision should not exceed the radius of the cornea.—("Annales d'Oculistique," March—April, 1872, pp. 157—186.)

THE HALO ROUND THE MACULA LUTEA.

Dr. Edward Loring has recently investigated the cause of the halo seen round the yellow spot on ophthalmoscopic examination. He thinks the explanations ordinarily given insufficient. On looking at some drawings of the macula lutea by Max Schultze, it occurred to Dr. Loring that the effect in question might be produced by the same causes within the eye that often produce it in other places in nature, or, in other words, that it might be the products of reflexion and refraction from the combination of curved surfaces which enter into the construction of this portion of the retina. The region, as figured in the diagram, bears in its formation a strong resemblance to a shallow cup, of which the rim is represented by a convex, and the bowl by a concave surface. If we look upon these curved surfaces as mirrors, they would each have their foci, one lying behind the other in front, according to their respective degrees of curvature, and, if light should be thrown perpendicularly against such a combination of curves, the apex of the outside rim or convex surface would, from well-known optical laws, appear illuminated, while the inside or concave surface would appear more or less in shadow. Thus we should have the effect of a darker centre, surrounded by an illuminated edge. Various experiments are described.—(Trans. Amer. Ophthal. Soc., 1871, p. 74.)

A scheme to aid in examining and recording cases of functional trouble of the eye, is given by Dr. Henry D. Noyes. We must refer to original paper.—(Trans. Amer. Ophthal. Soc., 1871, p. 81.)

OPERATIONS FOR SEPARATION OF POSTERIOR SYNECHIE.

Dr. B. Joy Jeffries reports cases in which he has successfully employed Passavant's plan of procedure. Instead of an iridectomy knife, he now uses a broad paracentesis needle. He finds no difficulty in manipulating delicate forceps in the wound thus made, and he loses but little aqueous before the iris is grasped. Atropine is continued, and the aqueous resecreted before the iris can again fasten itself to the capsule.—(Trans. Amer. Ophthal. Soc., p. 130, 1871.)

GENERAL SYPHILITIC INFLAMMATION OF THE EYE.

Dr. Delafield narrates two cases. A negro, aged 22, was treated in February for primary and secondary syphilis. In April his left eye inflamed. In October the globe projected so that the eyelids could not be closed. The eye was removed.

There was an annular staphyloma around the base of the cornea, filled with new growth involving iris, ciliary body, and choroid. The retina was detached. The second patient was a negro, aged 24. In the spring of 1869 he contracted syphilis. He was first seen in November. In the left eye there was a staphyloma of the sclerotic at the lower and inner margin of the cornea. There was bare perception of light. In the right eye there were synechiæ, &c., but he could count fingers with it. The left eye gradually protruded and was removed in March. The staphyloma and the anterior half of the globe were filled with a white mass. The iris was thickened and so were the ciliary processes. The choroid, excepting near the staphyloma, was healthy. The retina was detached funnel shaped, and its anterior was involved in the growth.—(Trans. Amer. Ophthal. Soc., 1871, p. 69.)

CASE OF PARTIAL TEMPORARY BLINDNESS.

Dr. Derby narrates the case of a married woman, aged 30, who one morning after breakfast suddenly was affected with hemiopia. All objects in the room appeared to have lost their right halves. She was seen a few minutes after the attack. No change in the fundus oculi could be detected nor any abnormality of refraction. An examination of the visual fields revealed a nearly symmetrical defect in each. They were both limited by a line running nearly vertically and close to the line of equal division. To the right of this line in both eyes the field failed. A visiting card was held at a distance of ten inches before each eye successively, and the patient directed to look fixedly at a small cross thereon. The right half appeared black. A figure is given. The affection lasted about twenty minutes and was followed by severe headache, dizziness, and nausea; the latter symptoms lasting until late in the afternoon. No further attack occurred. She said that she had repeatedly had similar attacks, which had always been followed by sick headaches. She had at times had distinct epileptiform attacks.—("The Medical Record," No. 141, p. 483. New York.)

GUNSHOT WOUND OF THE BRAIN, FOLLOWED BY FUNGUS CEREBRI AND RECOVERY WITH HEMIOPIA.

Drs. Keen and Thompson narrate the following cases:—A private, aged 23, was wounded on the occiput by a bullet. It entered in the middle line one and a quarter inches above the external occipital protuberance, and made its exit by a wound two to two and a half inches to the left of the middle line and three inches above the wound of entrance. For nine days he was not attended to. He was then conscious, but afterwards lost con-

sciousness and was more or less paralyzed in his right arm and leg. This lasted some two or three months. He had a fungus cerebri as large as his fist, which was shaved off five or six times. In four and a half months he was sent to Philadelphia and came under care. He had no paralysis, but was easily confused. His acuity of vision was good, but the "field" was found to be divided, in each eye, by a line passing through its centre in the vertical direction; total blindness existing to the right and perfect vision to the left of this line. No "blind-spot" could be detected in the right eye, but in the left it was quite evident. No ophthalmoscope changes could be detected.

Entrance of the bullet was marked by a slight depression, the wound of exit by a hollow two and a half by two inches and one inch deep. No bone had closed the opening. When recumbent, the hollow was gradually filled up and in about one minute replaced by a rounded protuberance. When he coughed, considerable sudden bulging occurred. The authors of the paper remark that the complete recovery from paralysis (as evinced by his subsequent severe labour) and the almost entire restoration of his mental faculties are remarkable, especially in view of the probable deep lesion of the brain, both by the primary injury and the subsequent fungus cerebri. The astonishing and rapid changes in the state of the cranial contents are worthy of note. The light thrown on the probable anatomy of the optic commissure is worthy of notice. From the examination made of this patient's hemiopia it seemed that the fibres from the left tract supplied the left side of the retina not from the porus opticus to the ora serrata, but less than this, that is, from a point outside the porus opticus, leaving a portion of sensitive retina between the optic disc and the line of blindness and allowing of the estimation of the "blind spot." On the right side the left tract, instead of supplying only the portion of the right half of the retina from the porus opticus to the ora serrata supplied more than this, namely, from the centre of the fundus (yellow spot) outside the optic disc to the ora serrata, thus merging the "blind spot" in the general paralysis and preventing its estimation. In other words, the fibres of the left optic tract supply mathematically the left halves of the two retinae and the right tract the right halves.

A second case occurred in a man, aged 55, disabled by partial paralysis of the left side. He had had a sunstroke seven years previously and another three years previously. The field of vision in each eye was bisected by a vertical line to the left of which there was entire blindness. No effort in this instance was made to test whether the field was limited strictly by the vertical line at the point of fixation, since the patient's intellect was not sufficiently clear.

AN ADDITIONAL METHOD FOR THE DETERMINATION OF ASTIGMATISM.

Dr. George Strawbridge suggests a ready means of detecting astigmatism. It is founded on an experiment of Helmholtz. A card resembling the one used by Dr. Green, but with long bars cut out of the cardboard instead of lines, and having a central perforation, is placed before a lamp or gas light. A central round point of light and a number of radiating bars of light are thus obtained. The patient standing at a distance of twenty feet looks at the central light. If astigmatic, he says the light is elongated in a particular direction, vertical or corresponding with one of the radiating bars. A diaphragm is now passed before his eye in the direction of the elongation of the light. The effect of this is to cut off one end of the prolongation. If the astigmatism be myopic, the elongation of the light vertical (for instance) and the diaphragm passed from above downwards the upper end of the elongated light will be cut off, whereas if the case be one of hypermetropic astigmatism the lower end would be cut off first. The *direction* of the meridian will correspond with the direction of the elongation of the light, and its amount of abnormality will be tested by trying what glass converts the elongated point of light into a circle.—(Trans. Amer. Ophthal. Soc., 1871, p. 100.)

ASTIGMATISM AS AN ACTIVE CAUSE OF MYOPIA.

Dr. John Green publishes further statistics in proof of the supposition that astigmatism frequently produces myopia.—(Trans. Amer. Ophthal. Soc., 1871, p. 105.)

REMARKS ON CATARACT.

Dr. Loring calls attention to a new mode of adapting astigmatic glasses after operations for cataract. A simple cylindrical glass of the required strength is first set in the spectacle frame in the usual way, the axis of the glass of course running in the required direction. A thin plano-convex glass is then ground and firmly fixed by its plane surface to the back or plane surface of the cylindrical glass by means of Canada balsam. The diameter of the plano-convex lens is only equal to the vertical diameter of the spectacle frame.

He also makes remarks on the want of any common standard of "success" after cataract operations. One operator taking $\frac{1}{4}$, another $\frac{1}{6}$, and another $\frac{1}{10}$ acuity of vision as "perfect result."—(Trans. Amer. Ophthal. Soc., 1871, p. 108.)

AN APPARATUS FOR TESTING THE PERCEPTION OF COLOUR.

Dr. Henry Noyes pastes on a circle of cardboard the slips of coloured paper which he uses as tests. Over this is placed an opaque disc with an aperture at one place of the size of a slip of the paper. The cardboard is then turned round till the required colour is exposed by the aperture. This apparatus can be held in any part of the "field," and the perception of that part is then registered on the black board with coloured chalks.—(Trans. Amer. Ophthal. Soc., 1871, p. 118.)

DETACHMENT OF THE RETINA, WITH LACERATION, AT THE MACULA LUTEA.

Dr. Henry D. Noyes narrates the case of a girl, aged 16, who had been struck in the eye by the cork of a beer bottle. The accident had happened three years before. The eye had remained stationary the whole time. There was then bare perception of light. On ophthalmoscopic examination the optic disc was found normal, whilst the retina was lifted up by a stratum of fluid, which was most abundant below and to the outer side. At the middle of the fundus the retina became of a greyish-white colour, and at the "yellow spot" was a round red spot of about half the diameter of the optic disc. In the erect image this showed a distinct, reddish, granular appearance, and it was evident that the epithelium of the choroid was exposed. The surface of the retina was evidently considerably in front of the level of the choroid, and this difference in depth suggested the idea of a laceration of the retina at the "yellow spot," and that the red spot was merely a hole through which the choroid was seen. Further proof of this was obtained by the phenomena of parallax. The edge was not tremulous, nor was there any tissue sloping down from it to the spot. It was evident the observer looked under the retina. Dr. Noyes has no explanation to offer of the mechanism of this rupture. He says it is the only instance he has seen or read of. The vitreous was so transparent that it could hardly have participated in the mischief.—(Trans. Amer. Ophthal. Soc., 1871, p. 128.)

THE USE OF ATROPIA IN THE TREATMENT OF INCIPIENT STRABISMUS.

In 1870 Dr. Green narrated three cases of strabismus in which the use of atropine constituted an important aid to the treatment. He now gives the result of another year's experience. 1. In even a very young child (in one a child of three years), with commencing strabismus dependent on hypermetropia, the repeated

instillation of atropine to the point of completely suppressing accommodation leads to the speedy abandonment of the habit of squinting, and the substitution for it of a kind of scowl, having for its object the exclusion of peripheric rays of light by the partially-closed lids. 2. This suspension of accommodation allows of the acceptance of the use of glasses, and the use of glasses in return tends to postpone the return of the deviation as the effect of the mydriatic passes off. 3. By repeating the instillation as often as the squint reappears, the latter may finally be overcome. 4. These results have been obtained in three cases of periodic squint of fully three years' standing. 5. In cases of permanent deviation, in which parallelism of the visual axes no longer occurs even in perfect rest of the eyes, the effect of the treatment (whether atropia alone, or atropia conjoined with glasses) has been confined to an improvement in the position of the eyes. In such cases, however, we have in the degree of the remaining squint an important index of the actual shortening of the interni, and a guide to the extent of the correction to be sought from tenotomy.

From these statements it will be seen that the success thus far attained is limited to the preservation of binocular vision through the wearing of convex glasses. This is, however, an advantage of no small importance, when we consider how rarely we are able to restore perfect binocular vision after it has once been positively lost in consequence of the complete development of a squint.—(Trans. Amer. Ophthal. Soc., 1871, p. 136.)

CASE OF READJUSTMENT OF THE LEVATOR PALPEBRÆ.

Dr. Green narrates the following :—A boy of five years of age was gored in the left upper eyelid by a cow's horn. No other defect finally resulted than complete paralysis of the levator palpebræ. At the end of two years Dr. Green saw him. The case was then evidently one of complete detachment of the tendon of the levator, without other injury of importance. He determined on operating. An incision of rather more than an inch in length was made through the skin along the upper border of the lid, and the dissection extended through the subcutaneous tissue in a direction nearly backward, so as to avoid opening the conjunctival sac. The upper surface of the eyeball was thus reached without having encountered any fibres of the orbicularis muscle, or in fact any other tissue than the subcutaneous fat which was apparently continuous with the fat of the orbit. A broad thin tendon was seen spread out on the exposed part of the globe, which proved to be the tendon of the superior rectus. Between this and the roof of the orbit the tendon of the levator was easily discovered, and no difficulty was experienced in attaching it, by three sutures, to the front of the tarsal cartilage. The wound was then closed

by three other sutures, leaving the ends of the three deep sutures protruding externally. The superficial sutures were removed on the fourth day, the deeper ones were allowed to come away spontaneously. Two months later the operation was reported to have been a perfect success.—(Trans. Amer. Ophthal. Soc., 1871, p. 136.)

PARALYSIS OF THE FIFTH NERVE FOLLOWED BY SLOUGHING OF THE CORNEA.

Dr. W. F. Norris narrates a case of paralysis of the fifth nerve from the extension of epithelial carcinomatous disease, in which ulceration of the cornea steadily progressed in spite of the utmost care used to protect the cornea.—(Trans. Amer. Ophthal. Soc., 1871, p. 138.)

CONGENITAL FISSURE OF THE LIDS.

Dr. Seely reports a case of congenital fissure of the lids, which was peculiar in that there was a very large portion of skin attached to the globe. The eyeball was perfect.—(Trans. Amer. Ophthal. Soc., 1871, p. 142.)

CONGENITAL ABSENCE OF THE EYEBALLS.

Dr. Strawbridge narrates two cases in which he had seen children born without eyeballs, and mentions a third in which there was absence of one eyeball, and in the other a large coloboma of the iris and choroid.—(Trans. Amer. Ophthal. Soc., 1871, p. 144.)

OPTIC NEURITIS WITH BRAIN DISEASE (DROPSY OF THE OPTIC NERVE SHEATH).

Professor W. Manz writes on this subject. He alludes to Graefe's distinction between the engorged disc and optic neuritis (descending), and his explanation of the former as due to compression of the cavernous sinus. As an objection to this explanation, Professor Manz adduces the results of injections of vessels as carried out by Schwalbe. From these it is certain that engorgement of the vena centralis does not by any means necessarily follow on compression of the cavernous sinus. There are other normal channels for the return of the blood from the vena centralis. There does not even necessarily result a strangulation of the optic nerve entrance from stasis in the neighbouring veins. Such a stasis, wholly apart from its relation to inflammation is, however, often present, and is the first change noticed in

the disc; other symptoms, such as swelling, haziness, &c., following later, but, it may be, not for a very long time. What then is the cause of this stasis, if it be not the compression of the sinus? The answer is found in the results of experimental injections carried on during the preceding year by Schwalbe, Schmidt, and the author. These injections were made on animals either during life or after death in such a way that fluids were forced from the cranial cavity into the sheath of the optic nerve. These experiments show that it is very easy to distend the space between the outer and inner sheaths (sub-vaginal space, Schwalbe) from the arachnoid space, and that an accumulation of the fluid injected takes place around the insertion of the nerve where, however, a limit is reached, at least towards the inside of the eyeball. This result suggests another explanation of the strangulation of the optic nerve entrance. It is probable that the same changes occur during life which can be so easily and regularly produced experimentally.

In a case of tubercular meningitis which he published in 1865, the author found an enormous dropsical distension of the optic nerve sheaths, and felt sure that the exudation in these was intimately connected with the serous effusion in the cerebral ventricles and the arachnoid space. He thought that the fluid in the optic nerve sheaths was of local origin from the vessels in the neighbourhood (indigenous dropsy); and so also were explained cases published by others (Ammon, Stellwag, &c.). His attention was again called to this case after he had practised injections into the arachnoid space, and when he knew the results of Schwalbe's experiments.

He now examined the optic nerves in cases in which during life there had been a suspicion of intra-cranial mischief with or without ophthalmoscopic changes, by removing the roof of the orbit and laying the nerves bare from above. He found dropsy of the sheath so frequently, that he came to the conclusion that it must be an almost invariable occurrence in connection with intra-cranial disease. Before removing the nerve, for closer examination, he adopted the plan of tying it at the optic foramen. The amount of distension varied greatly, but was almost always more marked towards the insertion into the globe. In the first recorded case the membrane was spread out in the form of an ampulla, of which the subsidence towards the sclerotic was steep, but towards the optic foramen more gradual. The swelling was frequently slight, but the whole orbital portion of the nerve was thickened, the sheath distended, glistening, transparent, and giving exit to some drops of a clear or turbid fluid when opened. There was no particular congestion, but rather pallor. Microscopic examination of the fluid and of the sheaths varied in connection with the time which elapsed after death. They are given fully. The optic nerve and retina were variously affected.

In many cases no changes could be detected. He never obtained a specimen early enough to demonstrate slight œdema of the disc and its neighbourhood. In some there were changes characteristic of the so-called optic neuritis. The blood-vessels appeared normal. The dropsy of the optic sheath always existed on both sides, often however in different degrees. The conditions found within the skull, which he thinks have the closest relation with the above changes, are (shortly) the existence of fluid in the arachnoid cavity with evidences of increased intracranial pressure. These most frequently are met with together, but occasionally where no free exudation was found its previous existence was rendered probable by dilatation of the ventricles or flattening of the convolutions. The quantity of the fluid found did not seem to bear any direct relation to the dropsy of the optic sheath. The kind of disease within the skull seemed immaterial. In one case of hæmorrhagic pachymeningitis, the sheath and the subvaginal space contained partly fluid, partly clotted blood. The generally received opinion has been that the dropsy of the sheath originated on the spot by an extension of the meningitis to the optic nerve and its coverings. Far from denying the possibility of this, the author nevertheless believes that the results of injections have thoroughly justified the acceptance of a transference from the cranial cavity. Fluids which have been injected into the arachnoid or sub-arachnoid space with moderate or even feeble pressure, reach the eyeball through various channels which pass along the optic nerve. The outermost (supra-vaginal space, Schwalbe) is separated by the outer sheath of the optic nerve from the "sub-vaginal" space, and this again by the inner sheath from the "arachnoid sheath" (Axel Key). The supra-vaginal space on the one hand (ocular side) communicates with Tenon's space and the perichoroidal space (lying between the choroid and sclera), and on the other through the optic foramen with the arachnoid space of the cranium. The latter is true also of the "sub-vaginal space," whilst the spaces between the nerve and the inner sheath, according to Axel Key, are in connection with the sub-arachnoid space of the brain and spinal cord. Moreover, the latter author adds that both of the passages immediately investing the optic nerve often unite near the globe. We may thus expect that fluid, whether existing in the arachnoid cavity, as happens more often in injections, or in the so-called sub-arachnoid space, will pass, under a certain amount of pressure, within the cranium, into the space between the outer and inner nerve-sheaths, or even into or under the latter. In a case in which a false membrane resulting from a blood clot was found on the dura-mater, and still fluid blood in the cranial fossæ, there were also analogous changes in the optic nerves. A detailed account of these changes is given. Apart from the interest which this case has in connec-

tion with the share of the optic nerve-sheaths in intra-cranial disease, it also bears on the question of the entrance, or (if we regard the gradual increasing intra-cranial pressure as shown by the symptoms) the driving in, of blood into the optic sheath. This view is based chiefly on the slight changes perceived in the sheaths and the nerve itself as compared with the intense alterations which the meninges and the brain had suffered.

Attention has already been called to the support which the idea of transmission of fluid obtains, from the fact that the dropsy of the sheaths is always bilateral, though more marked on one side than the other. After the injections with Prussian blue, the coloured fluid was always found in both nerves, though only one arachnoid cavity was injected. So also with regard to neuritis descendens. This occurs on both sides, or is more marked on one side than the other, or one side may be affected before the other; and from this symptom the author diagnoses, and mostly with success, on which side the starting point of the disease has been. The fact that the neuritis, at least at its commencement, is on one side, will, if for other reasons one suspects a cerebral cause, allow one to determine with a fair amount of certainty, the circumscribed nature of the affection, and, by chance, its position. At a later period if the other eye becomes affected it is always a stage behind the one first attacked, which may therefore be recognised at any time.

The later changes which result from the dropsy of the sheath are those which have been described in various cases of neuritis, and are of all degrees, from a simple cedema to a well-marked plastic neuritis. They are described fully. The intra-cranial pressure always remains of a higher degree than that in the optic sheath, so that if the former diminishes, the latter may subside, and the ophthalmoscopic appearances vanish.

A case of dropsy of the optic sheaths in connection with miliary tuberculosis is detailed with the results of a microscopic examination of the nerves. He quotes and remarks on cases published by Leber and v. Graefe. In several cases of tubercular meningitis in which tubercles were found in the choroids, a retinal hyperœmia was diagnosed during life. He thinks this must have been choroidal and in connection with the tubercles, and was not in connection with the dropsy of the optic nerve-sheaths also present.—(Reprint from *Deutsches Archiv. Klin. Med.*, ix, Bd.)

